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April 4, 1929

Foundrymen Go To Chicago for 33rd Meeting

Convention and Exhibition of American Foundrymen's Association in Stevens Hotel, April 8

WHEN American foundrymen convene in Chicago during the week of April 8 for the thirty-third annual meeting of the American Foundrymen's association, they will find their convention and exhibition amid surroundings distinctly different from those encountered in previous annual events.

For the first time in a number of years all of the activities will be held in one building. Committee meetings, technical sessions, luncheons, banquets and exhibits all will be conducted in the spacious Stevens hotel on Michigan boulevard. This is the fifth time the association has selected Chicago as the convention city. The convention and exhibition of foundry equipment and supplies will open on Monday and close at the conclusion of the program on Thursday. The morning sessions will start promptly at 10 o'clock and the afternoon sessions at 2 o'clock and 4 o'clock. Entertainment features are scheduled for the evenings. The exhibition hours will be from 9:00 a. m. to 5:30 p. m. daily. Examination of the summarized and complete programs on the following pages will indicate that the plans for the approaching meeting have been prepared with special attention to balance and comprehensiveness.

In planning for the technical sessions sched-

Two miles of Chicago skyline

Complete Program of Technical Papers

Monday, April 8

2:00 p.m.

Annual Business Meeting—Chairman: S. T. Johnston, President of the A. F. A.

4:00 p.m.

(a) **First Session: Steel Foundry Shop Operations Course.**
Subject—*Pouring Practice*—Chairman: C. N. Ring, Electric Steel Founders Research Group, Chicago.

(b) **First Session: Gray Iron Foundry Shop Operation Course.**
Subject—*Cupola Control*—Chairman: J. T. MacKenzie, American Cast Iron Pipe Co., Birmingham, Ala.

Tuesday, April 9

10:00 a.m.

(a) FOUNDRY COSTS—Chairman: A. E. Hageboeck, Frank Foundries Corp., Moline, Ill.
Practical Aspects of the Value of Foundry Cost Methods, by E. T. Runge, Cleveland.

(b) STEEL FOUNDING—Chairman: S. W. Utley, Detroit Steel Casting Co., Detroit.
Alloy Cast Steels, by H. A. Mason, Gould Coupler Co., Depew, N. Y.
Efficient Steel Casting Grinding, by F. A. Lorenz, Jr., American Steel Foundries, East Chicago, Ind.
Report of Investigation of Effects of Phosphorus and Sulphur in Steel, by R. A. Bull, Electric Steel Founders Research Group, Chicago.
Report of Committee on Steel Castings.

(c) CAST IRON METALLURGY—Chairman: H. W. Gillett, United States bureau of standards, Washington.
Quality of Pig Iron and Cast Iron as Affected by Blast Furnace Practice, by A. L. Boegehold, General Motors Corp., Detroit.

12:30 p.m.

(a) Round Table Luncheon and Meeting: *Uniform Nonferrous Cost Methods*—Chairman: E. B. Hazen, Brass Foundry Co., Peoria, Ill.

(b) Round Table Luncheon Meeting: *Steel Foundry Practice*—Chairman: R. J. Doty.

2:00 p.m.

GENERAL FOUNDRY MANAGEMENT AND PRACTICE—Chairman: Fred Erb.
Use of Scrap in Gray Iron, Malleable, and Electric Steel Mixtures, by E. K. Smith and F. B. Riggan, Stockham Pipe & Fittings Co., Birmingham, Ala.
Core Oil Testing and Specifications, by V. A. Crosby, Studebaker Corp., South Bend, Ind.
Safety and Sanitation in the Foundry, by F. H. Elam, American Steel Foundries, Chicago.
Science Hand in Hand with Labor, (Annual exchange paper of the Institute of British Foundrymen), by Frank Hudson, Glenfield and Kennedy, Ltd., Kilmarnock, Scotland.

4:00 p.m.

Second Session: Steel and Gray Iron Foundry Shop Operation Course.
Subject—*Sand Control Fundamentals*—Chairman: R. A. Bull.
Sand Control in a Malleable Foundry, by W. Ranis, Union Malleable Iron Co., Moline, Ill.
Sand Control in Gray Iron Foundries, by R. F. Harrington, Hunt-Spiller Mfg. Corp., Boston.
Reduction of Scrap, by E. W. Smith, Crane Co., Chicago.
Sand Control in a Steel Foundry, by H. A. Mason, Gould Coupler Co., Depew, N. Y.

6:00 p.m.

Dinner Meeting: For those interested in sand control.

7:30 p.m.

SAND CONTROL—*Practice and Research Developments*—Chairman: R. A. Bull.
Review of Sand Handling Installation Problems.
Report of Committee on Molding Sand Research.
Sound Castings, by R. W. Kurtz, Jas. B. Clow and Sons, Newcomerstown, Ohio.
Some Experiments in Sand Control, by E. F. Wilson, Jefferson-Union Co., Holyoke, Mass.
The Refractoriness of Foundry Sands, by J. F. McMahon, Mines Branch, Dept. of Mines, Ottawa, Canada.

Wednesday, April 10

10:00 a.m.

(a) NONFERROUS FOUNDRY PRACTICE—Chairman: G. H. Clamer, Ajax Metal Co., Philadelphia.
Some Practical Problems in the Brass Foundry, by H. J. Roast, National Bronze Co., Ltd., Montreal, Quebec, Canada.
An Open-Flame Hearth-Type Furnace for Melting Aluminum and Its Alloys, by R. J. Anderson, G. E. Hughes, and M. B. Anderson, Fairmont Mfg. Co., Fairmont, W. Va.
Electric Arc Furnaces in General Jobbing Brass Foundry, by J. B. Meier, F. & H. Foundry Co., Newark, N. J.
Report of Chairman of Division of Nonferrous Foundry Practice.

(b) IRON FOUNDING PRACTICE—Chairman: R. F. Harrington, metallurgist, Hunt-Spiller Mfg. Corp., Boston.
A Study of 26-Inch Cupola Operation, by F. B. Coyle, International Nickel Co., New York.
An Analysis of 54-Inch Cupola Performance, by E. E. Marbacker, Whiting Corp., Pittsburgh.
Investigation of Causes of Defective Castings for Enameling Ware, by C. J. Scullin, Tucker-Scullin Inc., St. Louis.
Report of Chairman of Division of Gray Iron Foundry Practice.

(c) MATERIALS HANDLING—Chairman: D. M. Avey, THE FOUNDRY, Cleveland.
Mold Handling, by R. J. Heisserman, Link-Belt Co., Philadelphia.
Materials Handling in the Foundry, by A. Walton, Philadelphia.

12:30 p.m.

Round Table Luncheon and Meeting: *Nonferrous Shop Practice*—Chairman: J W. Bolton, The Lunkenheimer Co., Cincinnati.

2:00 p.m.

FOREMAN TRAINING—*A Symposium*—Chairman: B. H. Johnson, Cresson Morris Co., Philadelphia.
The discussion of the symposium will be led by men prominent in the foreman training movement. The object of the meeting will be to show what has been accomplished when adequate training is had in foundry organizations.
W. F. Coleman, W. A. Jones Foundry & Machine Co., Chicago.
A. B. Peirce, director, department of industrial education, National Metal Trades association, Chicago.
M. H. Mellen, supervisor of education, General Electric Co., West Lynn, Mass.
G. A. McGarvey, agent, industrial education, federal board for vocational education, Washington.
A. D. Lynch, personnel director, Ohio Brass Co., Mansfield, O.
L. A. Hartley, educational director, National Founders association, Chicago.

4:00 p.m.

(a) Third Session: STEEL FOUNDRY SHOP OPERATION COURSE.
Subject—*Core Room Practice*—Chairman, A. C. Jones, metallurgist, Lebanon Steel Foundry, Lebanon, Pa.

(b) Third Sessions: GRAY IRON FOUNDRY SHOP OPERATION COURSE.
Chairman: H. W. Dietert, U. S. Radiator Corp., Detroit.

Thursday, April 11

10:00 a.m.

(a) MALLEABLE IRON FOUNDRY PRACTICE—Chairman: F. J. Lanahan.
Controlling the Atmosphere in Malleable Annealing Ovens, by W. F. Graham, Ohio Brass Co., Mansfield, Ohio.
Practical Aspects of White Fracture Malleable Iron, by Duncan Forbes, Rockford-Northwestern Malleable Corp., Rockford, Ill.
Shrinkage in Malleable Iron Castings, by H. A. Schwartz, National Malleable and Steel Casting Co., Cleveland.
Report of Representative on Committee Advisory to bureau of standards, by J. B. Deisher, Rochester, N. Y.
Report of Chairman of Division of Malleable Iron Foundry Practice.

(b) APPRENTICE TRAINING—Chairman: L. A. Hartley.
Report of Committee on Training of Apprentices.
Why We Train Apprentices, by J. A. Davies, Westinghouse Electric & Mfg. Co., Philadelphia.
Discussion—Led by A. E. Harrison, Allis-Chalmers Mfg. Co., Milwaukee.
How We Train Apprentices, by A. M. Cornell, Pettibone-Mulliken Co., Chicago.
Discussion—Led by C. D. Carey, American Steel Foundries, Verona, Pa.

12:30 p.m.

(a) Round Table Luncheon and Meeting: *Malleable Iron Foundry Practice*—Chairman: Scott Mackay, University of Wisconsin, Madison, Wis.

2:00 p. m.

HIGH TEST CAST IRON. *A Symposium.* Chairman: H. F. Moore, University of Illinois, Urbana, Ill.
European Developments:
Dr. E. E. Marbaker, Mellon Institute of Industrial Research, Pittsburgh.
Dr. Fritz Meyer, National Radiator Corp., Johnstown, Pa.
American Developments:
F. B. Coyle, International Nickel Co., New York.
R. S. McCaffery, department of metallurgy, University of Wisconsin, Madison, Wis.
R. S. MacPherran, Allis-Chalmers Mfg. Co., Milwaukee, Wis.
H. Bornstein, Deere & Co., Moline, Ill.
O. Smalley, Brooklyn, N. Y.

4:00 p. m.

(a) Fourth Session: Gray Iron Foundry Shop Operation Course.
Subject—*Cupola Control—Melting Operation*—Chairman: C. J. Scullin.

(b) Fourth Session: Steel Foundry Shop Operation Course.
Subject—*Heat Treatment of Steel Castings*—Chairman: John Howe Hall, Taylor-Wharton Iron & Steel Co., High Bridge, N. J.

uled for the April meeting, special care was taken to provide discussion of interest to all groups of foundrymen, including executives, metallurgists, engineers and shop men. Twenty-five events are scheduled on the program for the 4-day meeting, including sessions on steel, malleable, gray iron and nonferrous steel practice, foundry costs, sand control, material handling and foremen and apprentice training.

Among the outstanding features of the technical program are the gray iron and steel shop operation conferences which will be held daily at 4 p. m. These have been scheduled because of the successful precedent established at the Philadelphia convention in 1928 when a course on cupola practice attracted marked attention. The purpose of the conferences is to provide instruction in the fundamentals of shop practice. All foundrymen are invited to send their representatives to the gray iron and steel shop conferences.

The outline of the steel foundry course is as follows:

Monday, April 8—Pouring Practice

Chairman, C. N. Ring, assistant director, Electric Steel Founders Research Group, Chicago. Discussion leaders: A. F. Burtt, Pettibone-Mulliken Co., Chicago and E. F. Wilson, American Steel Foundries, East Chicago, Ind.

Tuesday, April 9—Sand Control

Chairman, Maj. R. A. Bull, director, Electric Steel Foundries Research Group, Chicago. This session will be combined with the general conference on Foundry Sand Control. H. A. Mason, Gould Coupler Co., Depew, N. Y., will lead the discussion on "Steel Foundry Sand Control."

Wednesday, April 10—Core Room Practice

Chairman, A. C. Jones, metallurgist, Lebanon Steel Foundry, Lebanon, Pa.; discussion leader, E. R. Young, Detroit Steel Casting Co., Detroit.

Thursday, April 11—Heat Treatment

Chairman, John Howe Hall, metallurgical engineer, Taylor-Wharton Iron & Steel Co., High Bridge, N. J.; discussion leaders: W. C. Hamilton, American Steel Foundries, East Chicago, Ind., and A. W. Lorenz, Bucyrus-Erie Co., South Milwaukee, Wis.

The outline of the gray iron shop

The 1929 meeting is the fifth held in Chicago by the A.F.A. since its founding in 1896

operation conferences is as follows:

Monday, April 8—Cupola Control, Raw Mateials

Chairman, Jas. T. MacKenzie, chief chemist, American Cast Iron Pipe Co., Birmingham, Ala.; discussion leaders: Prof. R. S. McCaffery, University of Wisconsin, Madison, Wis.; David McLain, McLain's System Inc., Milwaukee, and M. J. Evans, Mathieson Alkali Works, New York.

Tuesday, April 9—Sand Control

Chairman, Maj. R. A. Bull, Electric Steel Founders Research Group, Chicago. This session will be combined with the general conference on the fundamentals of sand control. R. F. Harrington, metallurgist, Hunt-Spiller Mfg. Corp., Boston, will discuss gray iron foundry sand control.

Wednesday, April 10—Gating and Risering

Chairman, H. W. Dietert, U. S. Radiator Corp., Detroit; discussion leaders: P. R. Ramp, Newport News Shipbuilding & Dry Dock Co., Newport News, Va.; and P. T. Bancroft, John Deere Harvester Works, Moline, Ill.

Thursday, April 11—Cupola Control—Influence of Cupola Operation on Character of the Iron

Chairman, C. J. Scullin, Scullin-Tucker Co., St. Louis; discussion leaders: Dr. F. W. Meyer, National Radiator Co., Johnstown, Pa.; F. K. Vial, Griffin Wheel Co., Chicago, and H. W. Dietert, U. S. Radiator Co., Detroit.

Interest in the training of foremen and apprentices has been recognized by the program committee which has provided sessions on these subjects. The meeting on foreman training on Wednesday afternoon will be in the form of a symposium in which a number of nationally known authorities in industrial education will participate. The session on apprentice training will be held Thursday morning.

In recent years the subject of foundry sand control has occupied a more important position in each succeeding program. This year the discussion will begin at the shop operation courses on Tuesday afternoon and will be followed by a dinner meeting after which a second session will be held. This is the first time an American Foundrymen's association technical session has been scheduled for the evening.

The programs for the meetings devoted to the problems of steel, gray iron, malleable and nonferrous foundry practice have been carefully arranged and it is expected that the usual gratifying attendance at these sessions will be equaled if not exceeded at the Chicago meeting.

On Monday evening an exhibitors' dinner will be held under the auspices of the American Foundrymen's association and the Foundry Equipment Manufacturers association. A dinner for engineering and shop instructors also is scheduled. The annual banquet, always an important function in connection with the annual meetings, will be held Wednesday evening. On Thursday morning at 11:30 a. m. a luncheon for gray iron foundrymen has been arranged under the auspices of the Gray Iron institute.

Condensed Schedule of A. F. A. Sessions

Monday, April 8

10:00 a.m. Exhibits Open.
Registration.
1:00 p.m. Committee Meetings.
2:30 p.m. Annual Business Meeting.
4:00 p.m. Gray Iron and Steel Shop Operation courses.
6:30 p.m. Annual Exhibitors dinner.
Dinner—Engineering and Shop Instructors.

Tuesday, April 9

9:00 a.m. Exhibits Open.
10:00 a.m. Foundry Costs.
Steel Founding.
Effect of Blast Furnace Operation on Pig Iron, Castings.
12:30 p.m. Round Table Luncheon and Meeting on Nonferrous Foundry Cost Methods.
Round Table Luncheon and Meeting on Steel Founding.
2:00 p.m. General Foundry Practice and Management.
4:00 p.m. Fundamentals of Sand Control. Gray Iron and Steel Shop Courses Will Be Combined With This Meeting.
6:30 p.m. Dinner Gathering of Those Interested in Sand Control.
7:30 p.m. Sand Control.

Wednesday, April 10

9:00 a.m. Exhibits Open.
10:00 a.m. Nonferrous Foundry Practice.
Iron Foundry Practice.
Materials Handling.
12:30 p.m. Round Table Luncheon and Meeting on Nonferrous Shop Practice.
2:00 p.m. Foreman Training.
4:00 p.m. Gray Iron and Steel Foundry Shop Operation Courses.
7:00 p.m. Annual Banquet.

Thursday, April 11

9:00 a.m. Exhibits Open.
10:00 a.m. Malleable Iron.
Apprentice Training.
11:30 a.m. Luncheon for Gray Iron Foundrymen (under auspices of Gray Iron Institute.)
12:30 p.m. Round Table Luncheon and Meeting on Malleable Iron Foundry Practice.
2:00 p.m. High Test Cast Iron.
4:00 p.m. Gray Iron and Steel Shop Operation Courses.

Stevens Hotel, where exhibition will be held

New Products and Better Business Lend Interest to A. F. A. Show

AMERICAN industry is advancing rapidly in the development of new methods, materials and equipment. In the foundry field marked progress has been made even in the brief span of the past 12 months. Definite accomplishments have been recorded in research, in foundry practice and in the design and construction for equipment for castings shops.

Opportunity is afforded by the exhibition to be held next week in connection with the thirty-third annual meeting of the American Foundrymen's association to show these late developments. The 150 manufacturers who will participate in the exhibition at the Stevens hotel are taking more than ordinary care in selecting equipment and supplies for display, partly because the space available this year is smaller than at several of the recent A.F.A. shows. It is reported that many of the exhibits will consist of products developed since the time of the Philadelphia show last year. The names of companies exhibiting at Chicago appear in the accompanying list.

Exhibit Will Be Diversified

Practically every commodity and service required in the operation of steel, gray iron, malleable and nonferrous shops will be displayed. Among the metallurgical materials to be exhibited are coal and coke, pig iron and ferroalloys. Melting equipment, including various types of electric furnaces, cupolas, crucibles and units for nonferrous metals will be shown. Accessories such as burners, pyrometers, control systems, etc., will be displayed, as well as a varied line of refractories for all purposes.

Everything required for molding will be represented, including pattern lumber, wood and metal patterns, pattern-making machinery, wood and metal flasks, clamps, and molding supplies. As in the past, the exhibits of molding machines, including a number of new developments, will constitute one of the outstanding divisions of the show.

Owing to the increasing interest in sand control, materials and equipment pertaining to this important branch of foundry operation will be prominently displayed. The leading dealers in molding sand will be represented, and an extensive exhibit of sand preparing and handling machinery will be demonstrated. Screens, buckets, riddles, pneumatic rammers and sand conveyors will be much in evidence.

Of increasing importance in recent shows have been the units for materials handling. This year manufacturers of overhead and locomotive cranes; electric, pneumatic and hand hoists; industrial trucks and tractors; tramrail and other overhead transportation systems and gravity and belt conveyors will be unusually well represented.

Foundrymen interested in core making departments will find complete equipment ready for their inspection. Cleaning room machinery also will be an important part of the show, the exhibits of sand blast cabinets and outfits predominating. Tumbling barrels, sprue cutters, grinding stands, welding and cutting devices and supplies, and goggles and other accessories for safety will be displayed. Foundrymen's clothing, including shoes, will be exhibited.

For the benefit of those requiring engineering service, a number of foundry engineers and builders will maintain booths in which the character of their work will be explained. The various houses dealing in foundry supplies will be well represented.

* * *

Affords Sales Opportunity

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ASIDE from the urge to witness new developments that will attract many foundrymen to the Chicago show, there is the factor of improved volume of business which will lend interest to the event. Conditions in the foundry industry generally are

considerably better today than at any time during the past few years. This fact will influence the attendance at Chicago.

Business Conditions Better

Comparison of business conditions in industry today with those prior to the Philadelphia show last spring reveals a marked improvement. Some of the factors influencing the markets for foundry products as of February, 1928, and February, 1929, are contrasted as follows:

	February, 1928	1929
Automobile production, U. S., number of passenger cars and trucks	323,796	466,084
Freight cars ordered	10,220	15,944
Machine tool orders, index*	195.8	302.0
Foundry equipment orders, index†	123.6	197.0
Steel castings orders, tons	91,076	115,539
Steel castings production, tons	87,727	97,468
Malleable castings production tons	65,359	74,683
Malleable production, per cent of capacity	66.8	77.7
Gray iron castings production, index‡		111.8

*Average monthly shipments, 1922, 1923 and 1924=100. Compiled by National Machine Tool Builders association.

†Average monthly shipments, 1922, 1923 and 1924=100. Compiled by Foundry Equipment Manufacturers association.

‡Average monthly production 1926, 1927, 1928=100. Compiled by Gray Iron institute.

In each case the figures, which unless otherwise noted are from the United States department of commerce, showed a gain in 1929 over 1928. Another indication of the increased activity of foundries is the production of pig iron. In February, 1928, according to the monthly compilation by IRON TRADE REVIEW the output was 2,898,668 tons, representing an average daily production of 99,954 tons. In February, 1929, the corresponding figures were 3,215,322 and 114,833 tons, respectively. The percentage of production to capacity was 73.6 in 1928 and 84.5 in 1929.

Awards Carnegie Medal to Dr. Bramley

The council of the British Iron and Steel Institute has this year decided to present the Carnegie gold medal of the Iron and Steel institute to Dr. Arthur Bramley, head of the metallurgical department of the Loughborough college. The medal, which was founded by the late Andrew Carnegie, is awarded to the research worker who, in the opinion of the council, has produced the most meritorious piece of research work in each year under the scheme of the Andrew Carnegie research scholarships of the institute. Dr. Bramley's work holds a prominent place in metallurgy.

List of Exhibitors at Foundry Show

Abrasive Co., Philadelphia.
Abrasive Industry, Cleveland.
Acme Oil Corp., Chicago.
Adams Co., Dubuque, Iowa.
Advance Milling Co., Chicago.
Air Reduction Sales Co., New York.
Ajax Electrothermic Corp., Trenton, N. J.
Ajax Metal Co., Philadelphia.
Albany Sand & Supply Co., Albany, N. Y.
Alloys & Products Inc., New York.
American Brake Shoe & Foundry Co., Chicago.
American Engineering Co., Philadelphia.
American Foundry Equipment Co., Mishawaka, Ind.
American Vent Wax Co., Lockport, N. Y.
Arcade Mfg. Co., Freeport, Ill.
Austin Co., Cleveland.
Automatic Transportation Co., Buffalo.
Axmann Sand-Throwing Machine Co., Cleveland.

C. O. Bartlett & Snow Co., Cleveland.
H. L. Baumgardner Corp., Chicago.
Bausch & Lomb Optical Co, Rochester, N. Y.
Beardsley & Piper Co., Chicago.
Bethlehem Steel Co., Bethlehem, Pa.
Black & Decker Mfg. Co., Towson, Md.
Blaw-Knox Co., Blawnox, Pa.
British Aluminium Co. Ltd., New York.
Buckeye Portable Tool Co., Dayton, O.

Campbell-Hausfeld Co., Harrison, O.
Carborundum Co., Niagara Falls, N. Y.
Carborundum Co., Perth Amboy, N. J.
Chain Belt Co., Milwaukee.
Frank D. Chase Inc., Chicago.
Chicago Mfg. & Distributing Co., Chicago.
Chisholm Moore Hoist Corp., Tonawanda, N. Y.
Clark Tructractor Co., Battle Creek, Mich.
Cleveland Vibrator Co., Cleveland.
Clipper Belt Lacer Co., Grand Rapids, Mich.
Corn Products Refining Co., New York.

Daily Metal Trade, Cleveland.
Dayton Pneumatic Tool Corp., Dayton, O.
Deister Concentrating Co., Ft. Wayne, Ind.
Wm. Demmler & Bros., Kewanee, Ill.
Detroit Electric Furnace Co., Detroit.
Diamond Clamp & Flask Co., Richmond, Ind.
Harry W. Dietert, Detroit.
Joseph Dixon Crucible Co., Jersey City, N. J.

Eastern Clay Products Inc., Buffalo.
D. A. Ebinger Sanitary Mfg. Co., Columbus, O.
Electric Storage Battery Co., Philadelphia.
Electro-Chemical Pattern & Mfg. Co., Detroit.
Electro Refractories Corp., Buffalo.

Fanner Mfg. Co., Cleveland.
Federal Foundry Supply Co., Cleveland.
Foundry Equipment Co., Cleveland.
Foundry Supplies Mfg. Co., Chicago.
The Foundry, Cleveland.

General Electric Co., Schenectady, N. Y.
Girard Smelting & Refining Co., Philadelphia.
Globe Steel Abrasive Co., Mansfield, O.
Great Lakes Foundry Sand Co., Detroit.
Great Western Mfg. Co., Leavenworth, Kans.

Harry Haze Inc., Chicago.
Hayward Co., New York.
Herman Pneumatic Machine Co., Pittsburgh.
Hoosier Molding Sand Co., Indianapolis.
Hynson, Westcott & Dunning, Chicago.

Illinois Clay Products Co., Joliet, Ill.
Illinois Testing Laboratories Inc., Chicago.
Indiana Consumers Gas & By-Products Co., Terre Haute, Ind.
Industrial Minerals Co., Columbus, O.
International Molding Machine Co., Chicago.
International Nickel Co., New York.
IRON TRADE REVIEW, Cleveland.

W. A. Jones Foundry & Machine Co., Chicago.

Chas. C. Kawin Co., Chicago.
Keener Sand & Clay Co., Columbus, O.
Spencer Kellogg & Sons Sales Corp., Buffalo.
Kling Bros. Engineering Works, Chicago.
Knefler-Bates Mfg. Co., Indianapolis.
H. Kramer & Co., Chicago.

Lancaster Coal & Sand Co., Lancaster, O.
Lava Crucible Co. of Pittsburgh, Pittsburgh.
Linde Air Products Co., New York.
Lindsay-McMillan Co., Milwaukee.
Link-Belt Co., Chicago.
Louden Machinery Co., Fairfield, Iowa.
Lowe Mfg. Co., Detroit.

Macleod Co., Cincinnati.
Paul Maehler Co., Chicago.
Malleable Iron Fittings Co., Branford, Conn.
Manhattan Rubber Mfg. Co., Passaic, N. J.
Mathews Conveyor Co., Ellwood City, Pa.
McCloud River Lumber Co., San Francisco.
R. W. McIlvaine Co., Chicago.
Milwaukee Electric Crane & Hoist Corp., Milwaukee.
Modern Pouring Device Co., Port Washington, Wis.
Moline Iron Works, Moline, Ill.
Moltrup Steel Products Co., Beaver Falls, Pa.
Mt. Jewett Fire Clay Co., Mt. Jewett, Pa.

National Engineering Co., Chicago.
National Smelting Co., Cleveland.
New Haven Sand Blast Co., New Haven Conn.
Wm. H. Nicholls Co., Richmond Hill, L. I., N. Y.
Northern Engineering Works, Detroit.
Norton Co., Worcester, Mass.

S. Obermayer Co., Chicago.
Oiless Core Binder Co., Cleveland.
Oliver Machinery Co., Grand Rapids, Mich.
Osborn Mfg. Co., Cleveland.

Pangborn Corp., Hagerstown, Md.
Peerless Sand Co., Conneaut, O.
Pennsylvania Lubricating Co., Pittsburgh.
Penton Publishing Co., Cleveland.
Pickands, Brown & Co., Chicago.
Pittsburgh Electric Furnace Corp., Pittsburgh.
Port Crescent Sand & Fuel Co., Detroit.
Pyrometer Instrument Co., New York.

Rogers Brown & Crocker Bros. Inc., Cincinnati.
Rohrbacher Shoe Co., Boston.
Royer Foundry & Machine Co., Wilkes-Barre, Pa.

Safety Clothing Co., Cleveland.
Safety Equipment Service Co., Cleveland.
Safety First Shoe Co., Framingham, Mass.
Safety Grinding Wheel & Machine Co., Springfield, O.
Semet-Solvay Co., New York.
Shepard Electric Crane & Hoist Co., Montour Falls, N. Y.
W. W. Sly Mfg. Co., Cleveland.
Smith Oil & Refining Co., Rockford, Ill.
Werner G. Smith Co., Cleveland.
Spencer Turbine Co., Hartford, Conn.
Standard Safety Equipment Co., Chicago.
Standard Silica Co., Chicago.
Sterling Wheelbarrow Co., Milwaukee.
Stone Pattern Mount Co., Bloomfield, N. J.
Swan-Finch Oil Corp., Chicago.
Swartwout Co., Cleveland.

Tabor Mfg. Co., Philadelphia.
Truscon Steel Co., Cleveland.
W. S. Tyler Co., Cleveland

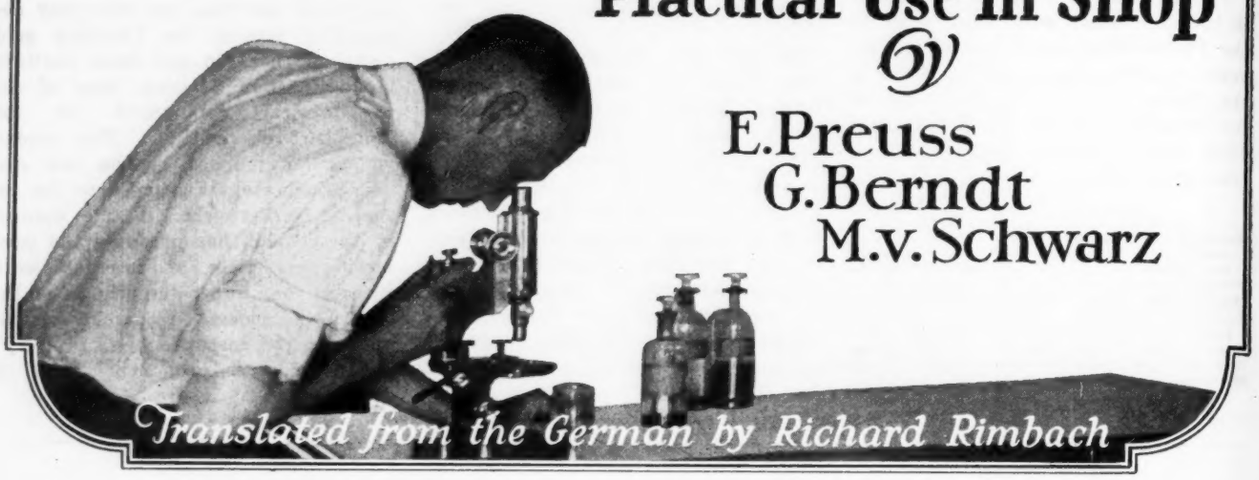
United Compound Co., Buffalo, N. Y.
United States Electrical Tool Co., Cincinnati.
United States Graphite Co., Saginaw, Mich.

Wadsworth Core Machine & Equipment Co., Akron, O.
F. H. Wheeler Mfg. Co., Chicago.
Whiting Corp., Harvey, Ill.
G. H. Williams Co., Erie, Pa.
Willson Products Inc., Reading, Pa.

Yale & Towne Mfg. Co., Stamford, Conn.
Young Brothers Co., Detroit.

Zanesville Sand Co., Zanesville, O.

Metallography Simplified for Practical Use In Shop



By
E. Preuss
G. Berndt
M. v. Schwarz

Translated from the German by Richard Rimbach

Chap. XI—Structure of Crystals; Annealing, Overheating and Burning

THE constitutional diagram of iron carbon alloys, as shown in Figs. 79 and 80, permits immediately recognizing the structural constituents occurring at different temperatures and also the manner of cooling which they have undergone (slow or quenching). Moreover, it shows the degree of an eventual annealing, but it does not disclose how the individual constituents arrange themselves or anything about the structure of the iron carbon alloys. Cementite, as previously mentioned, can arrange itself both in long crystals (Fig. 86), surrounding the pearlite like a net, and in small round islands (Fig. 87) uniformly distributed in it. The structure also is determined by the manner of cooling in the constitutional fields, as Belajew[24] was the first to show.

In Area II, Fig. 79, of simultaneous existence of solid solution and melt, the solid solution of lower carbon contents first is segregated then the melt, as discussed previously. With decreasing temperature, zones containing more and more carbon are established at the borders of the solid solution, whereby octahedron crystals grow especially in the direction of their axis and thereby form dendrites similar to fir trees. These, however, can form themselves freely only in hollow spaces (as Fig. 155 shows one in the pipe of a casting) while ordinarily they grow, forming a solid mass. In larger cast ingots they can assume a considerable size, since the cooling in the inside takes place slowly.

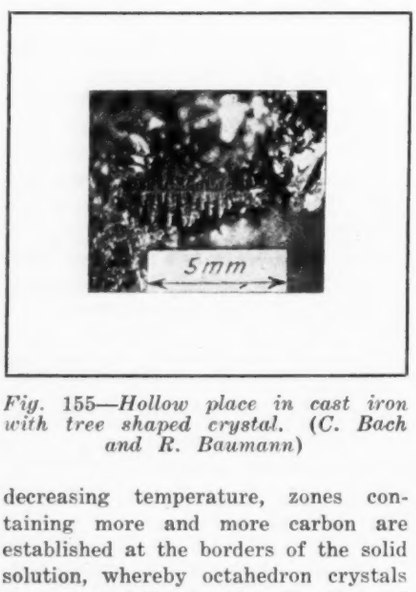


Fig. 155—Hollow place in cast iron with tree shaped crystal. (C. Bach and R. Baumann)

If the cooling inside Area IV, Fig. 79, takes place comparatively rapidly, the carbon does not have time to become equalized throughout the whole solid solution. After passing constitutional curve, *G S*, ferrite mainly will be precipitated on the axes of the crystal skeleton (as the place of lowest carbon). In the case of cementite it will be precipitated between the crystals. With this secondary crystallization an image of the primary from the melt is created, only with the difference that now the crystal structure becomes visible due to

Fig. 156—Fir tree structure in gray iron, etched microscopically. X 75.

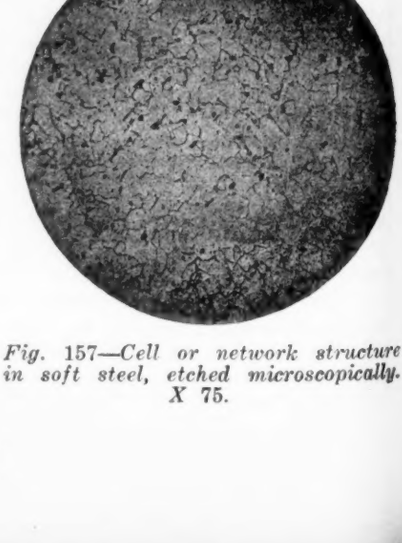


Fig. 157—Cell or network structure in soft steel, etched microscopically. X 75.

[24] N. T. Belajew, *Stahl und Eisen*, Vol. 32, page 1272, 1912.

the different coloring of the two constituents, as is proved by Fig 130 and, in a larger measure, by Fig. 156. This structure is designated as that of the large crystals or as pine tree structure. It always indicates that the iron has not been subjected to mechanical working, otherwise the crystal structure would have been destroyed. The direction of the crystals follows, in general, the heat flow lines. They are, therefore,, at right angles to the cooling faces[35], a phenomenon called transcrystallization[36].

If a casting has a sharp corner, the ends of the long crystals can meet in the line bisecting the angles (Fig. 158) which results in a surface of less strength, so that a fracture easily might occur here. Therefore, in fixing the shape of a piece all sharp corners and edges, as well as sudden, pronounced changes in section, must be

Fig. 159—*Widmannstaetten structure in cast steel, etched microscopically. X* 46. (*K. Meerbach.*)

avoided in all castings. Naturally, in choosing the shape, the requirements of the methods of casting and molding, shrinkage and pipe formation must be taken into account.

The so-called primary structure, after solidification of carbon steel, can be etched advantageously with the etching reagent of Oberhoffer[37], which makes visible especially phosphorus segregations in the solid solution or the so-called blowhole segregation[38].

If, contrary to what previously has been said, cooling in constitutional field IV, Fig. 79, proceeds slowly, the carbon is distributed uniformly in the crystals. However, the structure then occurring still depends on the speed of cooling below the constitutional

[35]J. Czochralski, Zeitschrift d. Vereins deutscher Ing. Vol. 61, page 345, 1917.

[36]Compare M. v. Schwarz: Intern. Zeitschrift f. Metallographie, Vol. 7.

[37]*Stahl und Eisen*, 1916, page 798 and 1920, page 705.

[38]See P. Oberhoffer: Des technische *Eisen*. pages 411, 426 and 481.

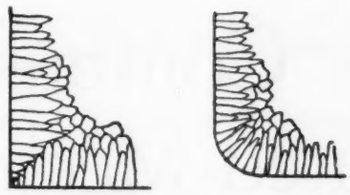


Fig. 158—*The growth of crystals in ingots.* (*According to C. H. Desch.*)

lines, *G S* and *S E*. If the cooling between Ar_3 and Ar_1 is slow compared with the crystal size, ferrite and cementite in hypereutectoid steels respectively are segregated at the crystal edges, as in Figs. 157 and 86, and the cell or net structure is obtained. If this cooling is faster, ferrite and cementite do not have sufficient time to migrate entirely to the borders of the crystals and the segregation takes place partly inside the octahedron parallel to their edges. In the etched section they appear then in the shape of triangularly intersecting lines, as in Fig. 159. This is the "Widmannstaetten structure," so called after its discoverer, who first observed it on meteoric iron (in a certain sense martensite also shows it). This structure is formed, also, when annealing for a longer time in constitutional Area IV, Fig. 79, and then cooling quickly between Ar_3 and Ar_1, conditions present usually in all drop forge pieces so that it occurs in these.[39] The surfaces of ferrite and cementite act so to speak, as splitting faces, so that an iron with this structure tends to fracture, particularly under impact stresses. For this reason the Russian government prescribed that its ordnance material must not show any

[39]A. Portevin and V. Bernard, Rev. de Met. 1912, page 544; see also *Stahl und Eisen*, Vol. 32, page 1275, 1912.

Fig. 161—*Etched section through a chrome steel ingot with pronounced ingotism.* (*According to Brearley-Rapatz.*)

Widmannstaetten structure. Often the breaking of cast steel rolls can be traced to it[40] (Fig. 159) shows such a roll with about 0.25 to 0.35 per cent carbon).

When annealing above A_3 and cooling correspondingly slowly this structure again can be removed, as can be seen from Fig. 160, which shows the structure of the same roll after annealing at 800 degrees Cent. Simultaneous working also has a good effect. Here a uniform distribution of ferrite and pearlite and at the same time a refinement of grain has resulted which made the material much stronger, This crystal structure, therefore, is characteristic for a good steel casting, since this has, in comparison with the Widmannstaetten structure, a greater strength, elongation, reduction of area and also notch toughness, which can be increased ten fold. This

Fig. 160—*Cast Steel* (*same as Fig.* 159) *correctly annealed; shows grain structures. Etched microscopically. X* 46. (*K. Meerbach.*)

improvement of the material is noticeable beginning at 760 degrees Cent., at which temperature a refinement of the structure takes place. The individual components of the structure, however, still arrange themselves preferably toward the splitting faces, while the cast structure (with 0.2 to 0.3 per cent carbon) disappears only at 850 degrees Cent.[41] With increasing carbon content, these temperatures decrease corresponding to the direction of lines *G S* (Fig. 80). It is still more practical to take the proper annealing temperature for steel castings from Fig. 162[42], where the relation between annealing temperatures and carbon contents can be seen.

Figs. 163 and 164 represent the

(*Concluded on Page* 916)

[40]K. Merbech, *Stahl und Eisen*, Vol. 40, page 141, 1920.

[41]P. Oberhoffer, *Stahl und Eisen*, Vol. 32, page 889, 1912; Vol. 33, page 891, 1913; Vol. 5, page 93 and 212, 1915.

[42]From P. Oberhoffer: Das technische, *Eisen*, page 346, Berlin, Julius Springer, 1925.

Open Hearth Combustion Process Is Regulated Mechanically

Venturi Tubes Equipped with Motor-Driven Fans Eject the Furnace Gases and Supply Draft in Definite Proportions

By G. A. Merkt

Engineering Department, Morgan Construction Co.

POWER house stacks of the venturi-type serve as an example of modern methods of exhausting furnace gases into the atmosphere. The Isley exhaust tube is similar to that used in power plants, except that in the latter a part of the furnace flue gases is used as propelling fluid for the ejection of the balance, whereas in the Isley control, fresh air enters the venturi tube through its fan. Another deviation from the usual power house system and from other combustion control systems is the duplex arrangement of the venturi tubes with their respective fans. These perform the dual duty of ejecting the furnace gases at one time and of furnishing the air for combustion at another.

A conventional view of an open hearth furnace with its regenerator chambers folded out and each end of the furnace system equipped with an Isley control unit, is shown in the accompanying illustration. With the throat damper of one venturi tube closed and that of the other tube open, the dual performance of each of the two tubes and their fan equipment is apparent. The respective performances are reversed as the relative positions of the small throat dampers are reversed.

The venturi tube is lined with fire brick and insulating material up to the throat, beyond which no further lining is required as the furnace gases are mixed with cold air in the throat and are wasted beyond this point. The gradually widening funnel is no higher than local conditions may make advisable as it is merely used to insure the lifting of the flue gases above buildings or yard cranes.

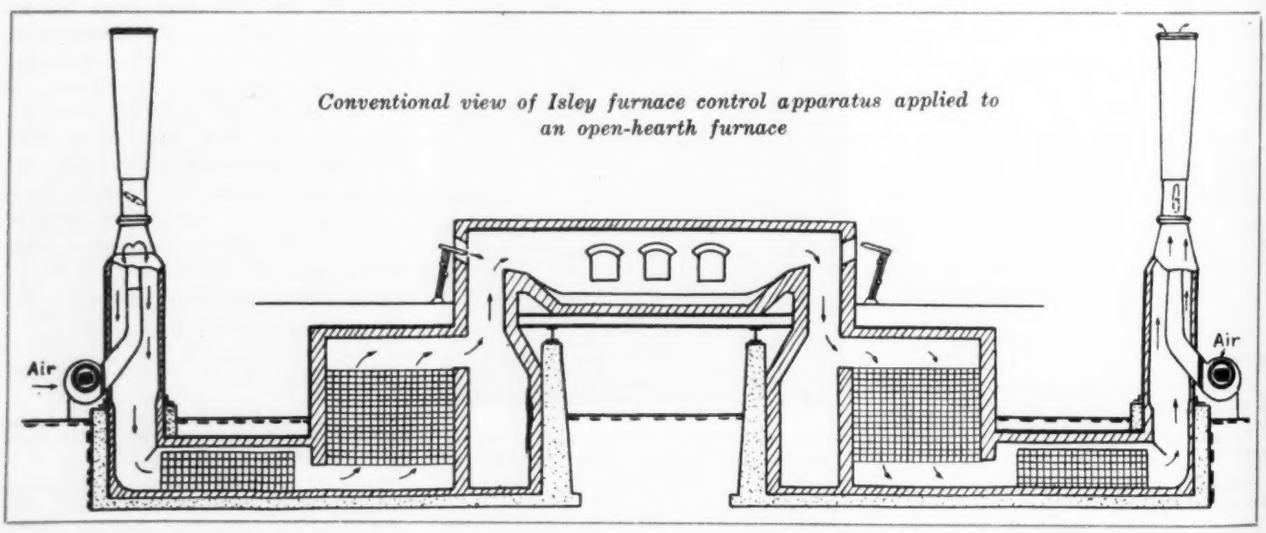
Moving Parts Protected

While the Isley control apparatus produces mechanical draft of definitely adjustable value, there are no moving parts exposed to high temperature and, on account of this feature, the equipment is free from wear and deterioration. The ejector process of the Isley control is based upon the dynamic properties of fluids in a venturi tube.

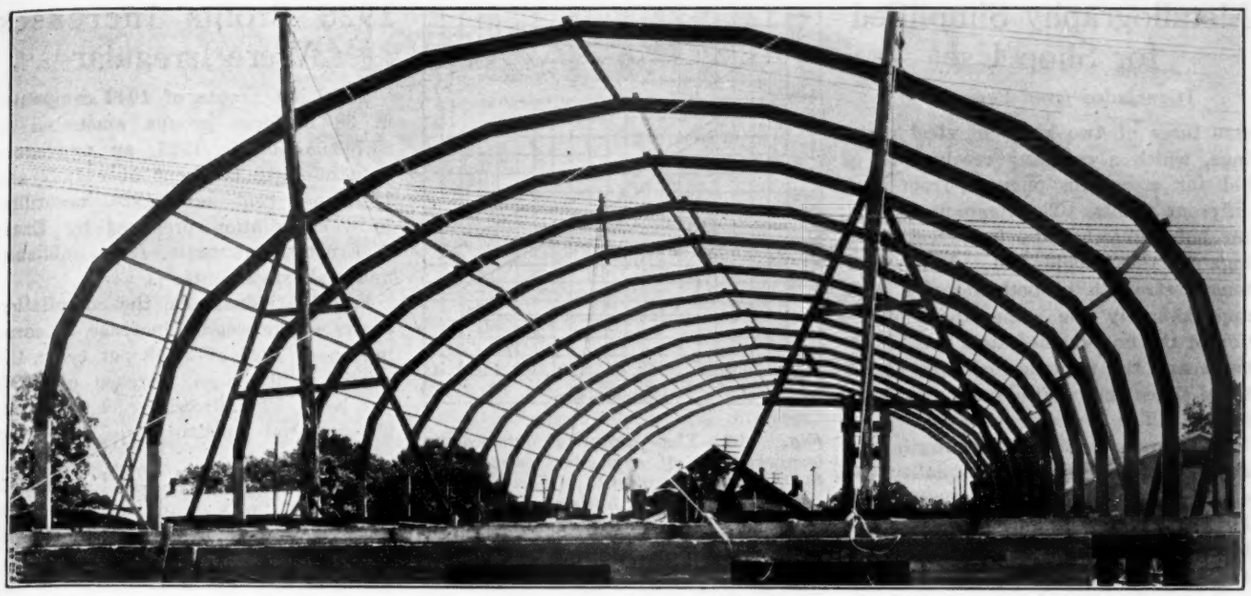
A large testing outfit has been installed in the laboratory of the Morgan Construction Co., Worcester, Mass. Many of the perplexing and complicated phenomena as encountered in furnace draft problems were cleared up for the best tube design. Each installation requires careful study and selection of proportions to produce a wide range of flexibility under all possible operating conditions without loss of control property over this entire range. Once the correct nozzle, throat and tube proportions, as well as fan and motor capacities, have been established, the combustion process definitely is controlled by regulating the output of each fan. No damper throttling or valve settings are required.

Since for every pound of atmospheric air discharged through the nozzle a definite weight of flue gas is lifted through the throat, regardless of flue gas temperature or density, the rate of flue gas removal remains constant as long as the fan output is so. The draft pressure takes care of itself and adjusts itself automatically to the flow of the flue gases within the range of capacity chosen for the individual installation.

The ejector type of mechanical draft eliminates all influences of weather, wind, atmospheric and furnace temperature, and makes the control of the furnace entirely independent. The output of each fan is simply regulated so as to obtain the rate of complete combustion desired with the least



Conventional view of Isley furnace control apparatus applied to an open-hearth furnace



Construct Structural Arches of Unusual Design

A building, 74 x 217, used for fruit packing has been built for the Seaboard Airline railway at Leesburg, Fla., the arches spanning the entire width of the structure. The steel arches are made of structural channels cut to form an arch when butted end to end. The entire fabrication of the arches by electric arc welding was completed on the ground.

The arches were raised into position and the entire structure thus formed tied in by welding channel purlins to the arches. The framework of the monitor is composed of angles and channels fabricated by arc welding.

All fabricating work on this building was done in the field, all connections being made by the electric arc welding process. Portable gas engine driven stable arc welders manufactured by The Lincoln Electric Co., Cleveland, were used to supply the current for executing the work.

amount of excess air which produces sufficient flame luminosity in the hearth. Since there are no leaky reversing valves in the flues, and since the air for combustion is measured, so to speak, by the ingoing fan, an ideal furnace atmosphere can be maintained in the hearth chamber. This is of appreciable benefit from the metallurgical point of view in that it eliminates excessive metal losses.

Referring to the accompanying illustration, it will be observed that in a furnace equipped with the Isley furnace control not only the regenerator chambers but also the flues and the ejector tubes themselves become regenerative in nature because the air enters the system almost at the point where the flue gases are being released to the atmosphere. Long flues are no longer an expensive detriment but a good investment, in that they extend the regenerative power of the system. The entire structure becomes an elongated regenerator with gradually diminishing temperatures so that the operating heat exchange in each part remains within narrower extremes from reversal to reversal.

The air returning to the port, on account of having been preheated before going through the checkers, is much hotter and the fluctuation of the air temperature considerably smaller at the ports. Reversing with the Isley furnace control is done by the temperature of the waste gases. For any given checker and flue construction and with a chosen rate of fuel consumption, there is a definite temperature saturation point, which after it has been reached, must not be maintained any longer than the time necessary to reverse the furnace. This temperature saturation point is like a relief valve, letting the heat escape into the atmosphere and ground as fast as it is supplied, and the degree at which it is located depends upon the amount of insulation used, the relative amount of radiating surface and a number of other factors.

In each installation there is found a most economic reversal temperature peak which may be adopted for the best operating practice and used as a guide for the proper process of reversing. For this purpose indicator lights are operated thermostatically by the recording pyrometer. First, a white light appears giving the furnace man a warning that the peak temperature is being approached, and then a red light goes on upon which signal the furnace is reversed. In fuel oil, natural gas or coke oven gas fired furnaces, the Isley control apparatus and the fuel supply, is reversed in four to five seconds and reversal losses are therewith reduced.

In order to secure flexibility and sensitive response of furnace control, it is of course necessary to not only install well shaped, simply constructed and practically equipped control apparatus, but also to select its capacity with great care in accordance with the inherent characteristics of the furnace for which it is intended and for the furnace practice which is to be expected. It is therefore always advisable to study the construction of the furnace, chambers and flues, their respective cross-sectional areas and the length of path which the furnace gases are following in the circuit. With a balanced pressure condition in the hearth chamber, obtained by the proper adjustment of the Isley control apparatus, the furnace gases sweep over the charge or bath in form of a low hanging flame, which cannot fill the space provided and therefore avoids erosion of front and back walls and leaves an insulating atmosphere between the roof and the combustion blanket.

Metallography Simplified for Shop Use

(*Concluded from Page* 913)

structures of two kinds of steel castings, which a company received as a bid for a certain purpose from two different plants. The company asking for bids subjected the two steel castings to the tensile test. While the tensile strength of both samples was approximately the same, the elongation of the fine grained steel was about twice and the reduction of area about three times that of the coarse grained steel.

The product of tensile strength and elongation is the so-called quality coefficient and corresponds approximately to the deformation property. The larger this is up to the point at which fracture occurs, the tougher and more resistant the material is, particularly to static stresses. Therefore, the fine grained steel according to the test results, is about twice as resistant to

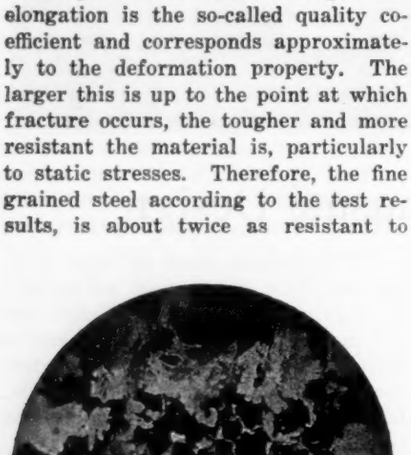


Fig. 163—*Fine grained steel casting, etched microscopically. X* 56.

such stresses as coarse grained. If one had been satisfied with a less thorough comparison of the two steels without a quantitative determination of the physical properties, the microscopic examination would have shown in a simpler, cheaper and faster way that the coarse grained steel is inferior in quality to the fine grained material.

NOTE: *The reference to malleable cast iron on page* 780 *of the March* 21 *issue pertains to European practice where white-heart malleable is used exclusively. The discussion, while correct, does not apply to American or black-heart practice.*

—THE EDITORS

Among the so-called rarer metals, tantalum plays an important role in the manfacture of dental and surgical instruments, pens, crucibles, electrodes

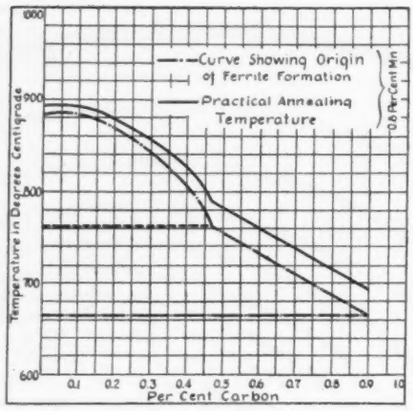

Curve Showing Origin of Ferrite Formation
Practical Annealing Temperature
Temperature in Degrees Centigrade
Per Cent Carbon
0.6 Per Cent Mn

Fig. 162—*The practical annealing temperatures of cast steel in relation to the carbon content. (According to P. Oberhoffer.)*

and electrolytic rectifiers. It alloys readily with many other metals. Its importance lies in the high melting point and great hardness.

Announce Program for A.E.S. Meeting

Preparations are under way for the fifty-fifth meeting of the American Electrochemical society, which will be held at Toronto, Ont., Canada, May 27 to 30. Headquarters of the meeting will be at the University of Toronto and the dormitories will be at the disposal of the visiting members and guests. The program has been announced as follows:

Monday, May 27

MORNING

Scientific session. "Electro-Magnetic Characteristics of Electrochemical Processes," will be discussed, Floyd T. Taylor, presiding

AFTERNOON

Informal open discussion of "Present and Future of Canada's Electrochemical Industries," R. A. Witherspoon, presiding Symposium on "Modern Methods in Teaching Electrochemistry," Prof. Roy L. Dorrance, chairman.

EVENING

Illustrated address by Prof. Harry A. Curtis, Yale university, on "The Nitrogen Fixation Factories of the World."

Tuesday, May 28

MORNING

Scientific-technical session: (Electric furnaces, electro-reduction, corrosion, etc.)

AFTERNOON

Visits to industrial plants

EVENING

Informal smoker and entertainment

Wednesday, May 29

MORNING

Session on electrodeposition, to be held jointly with the Toronto branch, American Electroplaters' society. (Iron, cadmium, chromium, etc.)

AFTERNOON

Joint session with Canadian Chemical association. Garden party

EVENING

Informal dinner and dance in co-operation with the Canadian Chemical association and the Canadian Institute of Chemistry

Thursday, May 30

Excursion to International Nickel plant, Port Colborne

1928 Profits Increases Were Irregular

Total net profits of 1042 companies in 38 business groups amounted to $3,748,051,000 in 1928, an aggregate gain of 17.19 per cent over 1927 and 11.35 per cent over 1926, according to a compilation prepared by Ernst & Ernst, accountants, from published financial statements.

For 815 industrials, the compilation shows an aggregate increase in earnings over 1927 of 20.49 per cent; 120 public utilities, an increase of 18.70 per cent; 82 railroads, 9.90 per cent; 25 financial institutions, 70.36 per cent.

"But this improvement," Ernst & Ernst say, "was quite irregular, both by groups and by members of the same groups. Of the 815 industrials, 516 were up, 299 were down; of 120 public utilities, 92 were up, 28 down; 82 railroads, 54 up, 28 down; 25 financial companies, 21 up, 4 down.

"Furthermore, of the 35 groups of

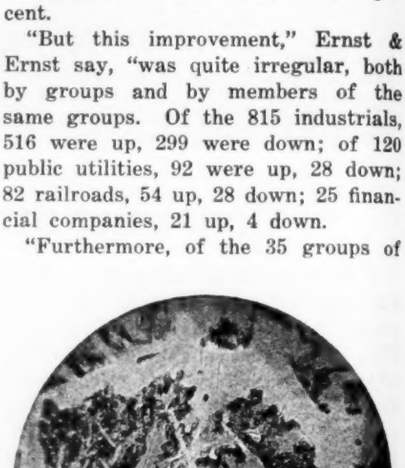


Fig. 164—*Coarse grained steel casting, etched microscopically. X* 56.

industrials, 9 showed lower earnings in 1928 than in 1927: Clothing manufacturers, restaurant chains, furniture manufacturers, glass products (very slight decrease), railroad equipment, rubber products, shoe manufacturers, textiles and miscellaneous traders.

"The other industrial groups showed increases by widely varying percentages. Of the thirty-eight groups in all, fourteen showed aggregate profits lower in 1928 than in 1926 as compared with the 9 which were lower in 1928 than in 1927. Three groups showed continued downward trend through both 1927 and 1928."

Officials of the Lynch Glass Machinery Co., Anderson, Ind., announce that at present half the products of the company are being crated for foreign shipment. The plant is working to capacity.

British Metals Institute Holds Its Coming-of-Age Meeting

Technical Sessions and Exhibition Feature Twenty-first Annual Convention—Membership Passes 2000 Mark

COMMEMORATING its twenty-first birthday this year, the British Institute of Metals held its annual meeting in London, March 13-14, The attendance was particularly large, both at the technical sessions and the banquet. A special feature was the Conversazione and Metallurgical Exhibition, which was held at the Science museum, London, on Thursday, March 14. This event was attended by about 600 guests. It is gratifying to note that the membership of the institute passed the total of 2000 at the end of last year.

The council has in hand arrangements for the next autumn meeting, to be held in Dusseldorf, Germany, Sept. 9-12, by invitation of the Verein Deutscher Ingenieure and of the Deutsche Gesellschaft fur Metallkunde. Steps also are being taken in connection with the visit of the institute to America in 1932. It was pointed out that the overseas membership now is one-third of the total membership. Election of officers for 1929-30 was announced as follows: President, Dr. Walter Rosenhain, National Physical Laboratory, Teddington, re-elected; vice presidents, T. Bolton, T. Bolton & Sons Ltd., London; Lt. Col. Sir Henry Fowler, chief mechanical engineer, London, Midland & Scottish Railway Co., Derby.

Corrosion Research Discussed

Dr. Maas, head of the German committee on corrosion research, addressed the meeting and presented the greetings of his German colleagues and made reference to the work effected by the corrosion research committee and suggested close co-operation with the German national committee for the protection of metals. This proposal was endorsed by Dr. Rosenhain.

A paper presented at the morning session on March 14 had for its subject "An Improved Form of Electric Resistance Furnace," by Dr. W. Rosenhain and W. E. Prytherch, National Physical Laboratory, Teddington. G. Barnard, discussing this paper, mentioned that he had had experience with furnaces packed with lamp black. He mentioned certain large furnaces, up to 4 feet in length, used to heat lamp filaments and made up of plates of carbon forming a box. The filaments were put into the furnace and packed with graphite. The temperature reached 3500 degrees. Replying to the discussion, Dr. Rosenhain stated that one advantage of the furnace is that there is no carbon in the atmosphere.

A paper by D. F. Campbell, Campbell and Gifford, consulting engineers, London, entitled "Recent Developments in Electric Furnaces," was followed by an interesting discussion. A. G. Lobley said that it is no simple matter to specify the thermal efficiency of a furnace. He stated that it is difficult to determine the heat loss of the furnace, and that methods generally used to determine this loss are not sufficiently accurate. To define the efficiency of a furnace he would prefer to use the figure of consumption per ton of material. He pointed out that when considering the question of cost, there are cases where an electric furnace can bring about a reduction in general overhead costs which more than compensates the cost of installation and the cost of operation. He mentioned the case of an eletcric furnace that can be placed near to the job because it occupies less space than a fuel-heated furnace, and this results in a considerable economy in handling costs and in labor.

Dr. Brownsdon, Birmingham, emphasized the difficulty of the refractory problem, and pointed out that the life of the refractory is an important item in figuring costs. He also said that linings must have certain specific properties, and in the melting of zinc, for instance, the lining should be such that zinc cannot filter through it. He suggested when installing annealing furnaces, the pickling and cleaning equipment should be coupled with the furnace. Dr. Hudson, director of the British Nonferrous Metals Research association, Birmingham, said that there has been an advance in the preparation of refractories in Germany.

Mr. Barclay stated that there still is a long way to go before all the factors bearing on the success of high-frequency furnaces can be known. He suggested that linings live much longer in arc furnaces, and said that he had used linings for the melting of pure nickel and nickel alloys that had run for as long as 12 months. He pointed out that there are subtle differences in the metal obtained in arc furnaces and in induction furnaces. He added that a great advance has been made during the past year in the range of units that now is obtainable in induction furnaces. T. H. Turner, of Birmingham, referred to two types of furnaces used in America made in the form of inverted boxes, which can be lowered from the roof of the shop. Mr. Barnard mentioned a certain special clay that he had used and which, when spread over tubes and refractories, gives them longer life. He emphasized the easiness with which temperature can be controlled in induction furnaces, and stated that this is an important point in continuous processes.

Agitation Gives Quicker Equilibrium

Dr. Rosenhain, referring to the question of agitation of the metal in the bath, said that in the manufacture of steel this agitation gives a quicker equilibrium of the steel and of the slag conditions. On the other hand, some small impurities get included in the bath, and he thinks that there is a certain amount of convection. To remedy this, he suggested stopping the current for a time and letting the bath rest. He emphasized the fact that induction furnaces permit of the control of the gases in the atmosphere of the furnace, and he mentioned that Dr. Rohn, of Hanau a. Main, Germany, had been able to obtain melts in vacuo with induction furnaces.

In replying to the discussion, Mr. Campbell stated that in comparing arc furnaces and high-frequency furnaces, account should be taken of the fact that conditions differ where a basic or an acid process is employed. He said that in practice it often occurs that one lets the bath rest by reducing the load, so as to reduce the agitation.

How Heat Treating Improves Alloy and Carbon Steel Castings

By J. Edward Donnellan

UNTREATED castings have a higher tensile strength than annealed castings but the ductility and impact values of such products are low.

Although both alloy and plain carbon steel castings are improved greatly by heat treatment, including quenching and tempering, the latter should not be specified by the customer unless he knows definitely what is wanted, and knows that the regular anneal or normalizing treatment will not be sufficient to give the physical properties for service requirements. Castings should be allowed to cool in the molds after pouring to a temperature below the critical range. Brittleness increases as the temperature drops, especially with alloy castings. Therefore, it is advisable to shake out and clean alloy castings before they become black. If adhering sand is not removed, it is more difficult to secure a uniform penetration of heat and more time is required for the operation. Risers and gates should be removed before heat treating because they are difficult to heat and increase the heat treating cost.

Because of the brittleness of alloy castings, it is good practice to remove risers while the castings are warm by flame cutting and not by breaking, which often starts minute cracks.

It may not be possible always to prepare castings for heat treatment before they become cold, but if it is, advantage may be taken of the remaining heat in the castings and the introduction of cooling strains is eliminated. This practice is quite important when dealing with alloy castings.

The selection of the proper heat treatment depends upon the composition, design, physical requirements, and the size of the castings. The chemical compositions for low carbon and alloy castings which generally are used for ordinary construction purposes are given in Table I. To take advantage of the properties that steel castings are capable of developing, they should be subjected either to an annealing, normalizing or quenching and tempering treatment. One or more of these treatments or some modification, according to requirements and conditions, is essential in developing the physical properties. The terms normalizing and annealing are confused in many shops. Although normalizing is a form of annealing, the

Table I

Chemical Composition of Low Carbon and Alloy Steel Castings

Steel No.	Type of Steel	Carbon Per cent	Manganese Per cent	Silicon Per cent	Chromium Per cent	Nickel Per cent	Vanadium Per cent	Molybdenum Per cent
	Low Carbon†	0.15-0.60	0.50-0.90	0.20-0.60				
1	C-V	0.25-0.35	0.60-0.90	0.20-0.50*			0.15-0.20	
2	C-V	0.35-0.45	0.60-0.90	0.20-0.50*			0.15-0.20	
3	C-V	0.45-0.55	0.60-0.90	0.20-0.50*			0.15-0.20	
4	C-Cr	0.25-0.35	0.60-0.90	0.20-0.60	0.80-1.10			
5	C-Cr	0.35-0.45	0.60-0.90	0.20-0.60	0.80-1.10			
6	C-Cr	0.45-0.55	0.60-0.90	0.20-0.60	0.80-1.10			
7	Cr-V	0.25-0.35	0.60-0.90	0.20-0.60	0.80-1.10		0.15-0.20	
8	Cr-V	0.35-0.45	0.60-0.90	0.20-0.60	0.80-1.10		0.15-0.20	
9	Cr-V	0.45-0.55	0.60-0.90	0.20-0.60	0.80-1.10		0.15-0.20	
10	Cr-Ni	0.25-0.35	0.60-0.90	0.20-0.60	0.50-0.90	1.25-1.75		
11	Cr-Ni	0.35-0.45	0.60-0.90	0.20-0.60	0.50-0.90	1.25-1.75		
12	Cr-Ni	0.45-0.55	0.60-0.90	0.20-0.60	0.50-0.90	1.25-1.75		
13	Cr-Mo.	0.25-0.35	0.60-0.90	0.20-0.60	0.70-1.00			0.25-0.35
14	Cr-Mo	0.35-0.45	0.60-0.90	0.20-0.60	0.70-1.00			0.25-0.35
15	Cr-Mo	0.45-0.55	0.60-0.90	0.20-0.60	0.70-1.00			0.25-0.35
16	Mn	0.25-0.35	1.00-1.50	0.20-0.50				
17	Mn	0.25-0.35	1.50-1.75	0.20-0.50				
18	Mn	0.35-0.45	1.00-1.50	0.20-0.50				
19	Mn	0.35-0.45	1.50-1.75	0.20-0.50				

†The carbon content is sub-divided in the tables where heat treatments are prescribed.
*0.20 to 0.30 per cent silicon preferred.

operations and the results obtained are as follows: Annealing is a heating and cooling operation of a material in the solid state. This process usually implies a relatively slow cooling. The purpose of such a heat treatment may be: (*a*) to remove gases, (*b*) to remove stresses, (*c*) to induce softness, (*d*) to alter ductility, toughness, electrical, magnetic or other physical properties, or (*e*) to refine the crystalline structure of the metal.

Certain specific heat treatments come under the term annealing. Full annealing is the heating of iron-base alloys above the critical temperature range for a proper period of time followed by slow cooling through that range. The annealing temperature is generally 100 degrees Fahr. above the upper limit of the critical range, and the time of holding usually is not less than one hour per inch of section of the heaviest object being treated. The objects being treated ordinarily are allowed to cool slowly in the furnace. However, they may be removed from the furnace and cooled in some medium which will prolong the time of cooling as compared to unrestricted cooling in air.

Table III

Heat Treatments for Alloy Castings

Steel Nos. as listed in Table I	Temperature degrees Fahr.	Cool in	Treatment
1, 2, 3, 16, 17, 18, 19	1600-1700	Air	Normalizing
4 to 15	1600-1800	Air	Normalizing
1, 2, 3, 16, 17, 18, 19	1500-1600	Furnace	Annealing
4 to 15	1550-1650	Furnace	Annealing

Table II

Heat Treatments for Carbon Castings

Carbon range	Temperature degrees Fahr.	For normalizing cool in	For annealing cool in
0.15-0.40	1600-1700	Still Air	Furnace or other medium for cooling slowly*
0.40-0.60	1550-1600	Still Air	Furnace or other medium for cooling slowly*

*The castings are cooled slowly until the temperature has dropped to 800 degrees Fahr. or below.

The normalizing and annealing temperatures for carbon and alloy steel castings are given in Tables II and III.

A double normalizing treatment sometimes is employed where quality is of utmost importance. The castings are first heated to a high temperature, ranging from 1600 to 2000 degrees Fahr. This high temperature breaks up the casting structure, diffuses the segregates and forms a homogeneous structure. To refine the coarse structures resulting from the high temperature, the castings are reheated to a temperature between 1475 and 1600 degrees Fahr.

This treatment is beneficial in producing homogeneous steel, but has disadvantages in that the high temperature is severe on the furnace linings.

W. J. Merten has covered successfully this high normalizing treatment in a paper published, January, 1928, in the *Transactions*, American Society for Steel Treating. Mr. Merten recommends the following treatment for normalizing large castings of over 50,000 pounds.

"Heat the castings slowly and uniformly to 2012 degrees Fahr. (1100 degrees Cent.) under atmospheric conditions that will cause minimum scaling. The minimum time rate to reach that temperature should be approximately 1½ hours per inch of minimum dimensions of the heaviest section. Hold at this temperature for at least 2 hours per inch of width of cross section. Cool in the furnace with the door open to 1600 degrees Fahr., and then in air until black (800 degrees Fahr.) Reheat to 1600 degrees Fahr. at a rate of 1 hour for every inch of width of cross section. Hold at 1600 degrees Fahr. one hour for every inch of width of cross section. Cool in air to black heat. Reheat to 1275 degrees Fahr. and cool in furnace to 600 degrees Fahr., then in air."

After normalizing carbon castings at the temperatures given in Table II, they may be tempered at some temperature below the critical temperature range, depending upon requirements, but 1200 degrees Fahr. usually is the temperature suitable for most purposes. This tempering gives better ductility and relieves strains.

By full annealing castings, that is, heating well above the critical range and cooling slowly, a fairly uniform but not fine grained structure is secured. The structure is much finer by faster cooling, such as air cooling, and the physical properties are higher. Full annealing is not necessary unless on heavy sections and for alloy castings for machining.

The design and size of the cast-

Recommends Practice for Castings

THE accompanying article is from a paper presented before the Western Metal congress, Los Angeles, Jan. 14-17. It is based on a report on tentative recommended practices for heat treating carbon and alloy steel castings prepared by a subcommittee of the American Society for Steel Treating. The author is secretary of the technical committees of the society and is editor of its handbook. Preparation of the test coupons, heat treatment and physical testing was supervised by A. W. Lorenz, Bucyrus-Erie Co., Milwaukee.

Table IV

Quenching and Tempering Carbon Steel Castings

Carbon Range	Quenching Temp. Deg.* F.	Time at Heat	Quenching Medium and Temp. Deg. F.	Tempering Temp. Deg. F.	Tempering Time at Heat
0.15-0.30	1600-1650	½ hr. for every inch of dia. or thickness	Water at 70	800-1350	At Least 3 hrs.
0.30-0.40	1550-1600	½ hr. for every inch of dia. or thickness	Water at 125	800-1350	At Least 3 hrs.
0.40-0.60	1500-1550	½ hr. for every inch of dia. or thickness	Water at 125 or Oil	800-1350	At Least 3 hrs.

*These temperatures are based on the assumption that the castings were first annealed.

Table V

Quenching and Tempering Alloy Castings

Steel Nos. as listed in Table II	Type of Steel	Quenching Temperatures Degrees Fahr.	Quenching Medium‡	Maximum Tempering Temperatures Degrees Fahr.	Cool in
1	C-V	1550-1600	Water or Oil	1300	Air or Furn.
2	C-V	1500-1550	Water or Oil	1300	Air or Furn.
3	C-V	1475-1500	Water or Oil	1300	Furnace
4	C-Cr	1575-1650	Water or Oil	1275	Air or Furn.
5	C-Cr	1525-1575	Water or Oil	1275	Air or Furn.
6	C-Cr	1500-1525	Water or Oil	1275	Furnace
7	Cr-V	1575-1650	Water or Oil	1275	Air or Furn.
8	Cr-V	1525-1575	Water or Oil	1275	Air or Furn.
9	Cr-V	1500-1525	Water or Oil	1275	Furnace
10	Cr-Ni	1515-1550	Wtaer or Oil	1250	Air or Furn.*
11	Cr-Ni	1490-1515	Water or Oil	1250	Air or Furn.*
12	Cr-Ni	1475-1490	Water or Oil	1250	Furnace*
13	Cr-Mo	1575-1650	Water	1300	Air or Furn.†
14	Cr-Mo	1525-1575	Oil	1300	Air or Furn.†
15	Cr-Mo	1500-1525	Oil	1300	Furnace†
16	Mn	1600-1650	Water	1250	Air or Furn.
17	Mn	1600-1650	Water	1250	Air or Furn.
18	Mn	1550-1600	Water	1250	Air or Furn.
19	Mn	1550-1600	Water	1250	Air or Furn.

‡Air quenching is often made use of in the hardening of alloy steel castings of intricate design which would be likely to crack in the more drastic water or oil quench.

*The shock resistance is sometimes improved by oil quenching from the tempering temperature.

†A long soak is required at the tempering temperature.

ing are the governing factors in deciding whether or not a casting should be quenched. Intricately designed castings should not be given that treatment as cracks are likely to develop. These often appear internally and are not detected until after the castings are in service. Where quenching is required the design should be such that the operation is practical and will not produce cracks.

Water or oil quenched castings develop the maximum available properties of the steel. Alloy castings should receive some form of quench, either water, oil or air to derive the benefits of the alloys. With certain designs and with castings containing defects there is danger of cracking from the liquid quenching. Where such dangers are apparent, but a quench is necessary to develop required properties, some form of air quenching may be of help in accomplishing the desired end. Such castings may be cooled in air as in normalizing. The furnace doors may be so manipulated that the proper rate of cooling is obtained, or the cooling may be accelerated by using an air blast, provided the design of the casting will permit. Such accelerated air cooling also may be resorted to with large castings requiring a quenching treatment to develop their properties.

After quenching, the castings should be tempered to relieve the quenching strains and to develop the properties required. As the temperature of the temper is increased the hardness is decreased, but the reduction of area, elongation and impact values are increased.

The tempering and quenching temperatures for castings as recommended by the steel castings committee of the American Society for Steel Treating are given in Tables IV and V.

Test samples may be distributed throughout the furnace for fracture inspection after heat treatment to augment that method of control. Care must be exercised when inspecting such fractures, as the test fracture is not always the index to the structure of the castings. The size of specimen, position in furnace, size of charge, and methods of cooling are governing factors.

Castings and patterns usually are designed to avoid warping during the solidification period. However, it often is necessary to make alterations to avoid that defect.

In hot straightening, as well as in welding, the beneficial effects of heat treatment may be entirely lost. If the casting is heated locally, then straightened, and allowed to cool in the air, stresses are introduced and if the temperature is sufficiently high the structure obtained in the heat treatment operation is destroyed. In such practice, the casting should be retreated. Better results are obtained if the entire casting is heated to a temperature just sufficient for the straightening, but below the temperature of the last heat treatment performed. After straightening, the castings should be cooled slowly to eliminate the stresses.

The type test bar or coupon used for determining the quality of the metal or the heat treatment, depends upon the conditions comprising the problem, such as design, size and service. The design of the test coupon and its position on the casting should be such that the coupon is sound. To represent the metal in the casting, the coupon should approximate the maximum cross-section of the casting. The charge of castings should be arranged in the furnace and the heating conducted so that the castings and coupons receive the same treatment.

Two Steels Heat Treated

To reveal the difference in structure and the effect of heat treatment upon steel castings, two basic open-hearth steels were selected; one a plain steel whose analysis was carbon, 0.24, manganese, 0.92, silicon, 0.38, sulphur, 0.031, phosphorus, 0.013, and the other a nickel-chromium steel whose analysis was carbon, 0.30, manganese, 0.82, silicon, 0.37, sulphur, 0.028, phosphorus, 0.009, nickel, 1.73, chromium, 0.63.

The test coupons were flame-cut from the feeder before performing any of the heat treating operations. The test section then was cut into 3 pieces each about 5 inches long and one small sample provided for microscopic examination of the steel in the *as cast* condition or before treatment.

The test specimens were subjected to an annealing, normalizing and quenching treatment. The symbols designating the processes to which the specimen were subjected follow:

L C—Low carbon steel as cast

Table VI

Physical Properties of Steel Castings After Heat Treating

Symbol	Treatment	Yield Pt. lbs. per sq. in.	Tensile Str. lbs. per sq. in.	Elong. per cent in 2 inches	Red. of Area Per cent	Brinell Hard. Numbers
L A	Annealed	38,250	70,600	32.5	49.2	143
L N	Normalized and tempered	37,250	69,150	38.0	60.6	137
L H	Quenched and tempered	53,850	80,050	32.5	65.6	170
N A	Annealed	55,650	96,400	24.0	45.7	179
N N	Normalized and tempered	54,250	93,950	26.0	51.1	179
N H	Quenched and tempered	95,450	114,550	22.0	55.5	228

L A—Low carbon steel annealed

L N—Low carbon steel normalized and tempered

L H—Low carbon steel water quenched and tempered

N C—Alloy steel as cast

N A—Alloy steel annealed

N N—Alloy steel normalized and tempered

N H—Alloy steel water quenched and tempered.

The *L C* and *N C* specimens were given no heat treatments; *L A* and *N A* specimens were annealed at 1650 degrees Fahr. with a 20-ton foundry charge in car-type furnace and tempered at 1200 degrees Fahr.

The *L H* specimen first was normalized at 1650 degrees Fahr. as described previously, then heated to 1600 degrees Fahr. in a box-type electric furnace with normal charge of 1500 pounds of castings, which had the same cross-section as the test bars. The full charge was plunged by a special quenching machine into water maintained at 135 degrees Fahr. for a period of 40 seconds and tempered at 1200 degrees Fahr.

The *N H* specimen was given the same treatment as *L H*, except the quenching temperature was 1500 instead of 1600 degrees Fahr.

The physical properties shown in Table VI were obtained after the specimens were heat treated.

Figs. 1 and 3 show the Widmanstatten or cleavage structure for the carbon steel in the *as cast* condition. This structure is quite typical for this class of steel. Figs. 5 and 7 show the alloy steel in the *as cast* condition. It should be noted that there is apparently much less free ferrite and that the cleavage structure is not in evidence in Figs. 5 and 7.

By subjecting these steels to a full annealing (see heat treatments *L A* and *N A*), the cast structure is eliminated entirely as shown in Figs. 2 a uniform distribution of ferrite and pearlite in both steels, with a somewhat better distribution of both.

When these steels are normalized and tempered (see heat treatments *L N* and *N N*), the cast structure practically is eliminated. However, traces of the cleavage structure remain in the carbon steel. The ferrite areas in the alloy steel appear to be smaller than in the same steel annealed. Pearlite is well distributed.

By normalizing these steels to eliminate the cast structure and then quenching and tempering as described previously (see heat treatments *L H* and *N H*), a fine, well distributed structure of troostitic-sorbite is obtained.

The quenched alloy steel exhibits a finer structure and the constituents are more evenly distributed than in the carbon steel.

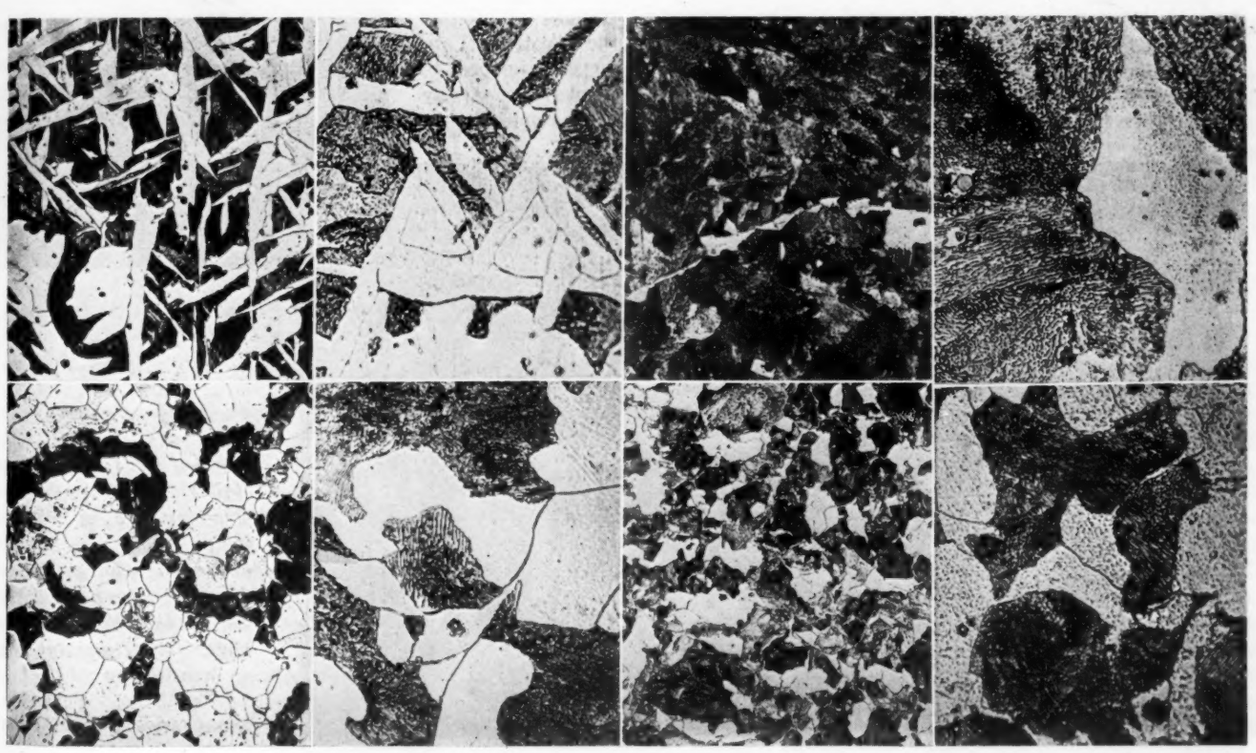
The yield points and tensile strength for both steels have been increased greatly by quenching and tempering as shown in Table VI, and the ductility for both steels is still very satisfactory.

It is interesting to compare the full annealed structure with the normalized structure and the physical properties obtained from each heat treatment as shown in Table VI. The two treatments give similar results with better ductility for both steels in the normalized condition. It appears that a normalizing and tempering treatment is sufficient, especially with the alloy steel.

By quenching the normalized steels in water and then tempering, some worth while properties are developed and the steels retain good ductility.

Use 'Phone Typewriter

The telephone typewriter, which has been used by newspapers and permits the sending and receipt of messages without the use of a skilled operator, is now available for the business field, the American Telephone & Telegraph Co. advises. The machine is similar to an ordinary typewriter and can be operated by any typist. It prints on a page of standard size or on a narrow tape and has a capacity of 60 words a minute. For furnishing this service approximately 80,000 miles of wire is available.



(*First row left*) *Fig.* 1—*Low carbon steel as cast X* 100. *Fig.* 2—*Low carbon cast steel treated according to heat treatment LA X* 100. (*Second row*) *Fig.* 3—*Same as Fig.* 1 *X* 500. *Fig.* 4—*Same as Fig.* 2 *X* 500. (*Third row*) *Fig.* 5—*Nickel-chromium steel as cast X* 100. *Fig.* 6—*Same steel as Fig.* 5 *given heat treatment NA X* 100. (*Fourth Row*) *Fig.* 7—*Same as Fig.* 5 *X* 500. *Fig.* 8—*Same as Fig.* 6 *X* 500

Heat Treating Unit Is Adjustable for Universal Operation

Furnaces with Pushers and Pullers Interconnect with Time Controls—Heat Treating Cycles Can Be Varied

By J. W. Manker

Vice President, Surface Combustion Co.

A NEW heat treating unit that is universal in its application, in that it can be adjusted for almost any method of heat treating steels and their alloys, has been placed in operation at the plant of the Packard Motor Co., Detroit. This installation consists of three large furnaces and a quench tank, set in a single straight line in series, so that the work can pass progressively through each in turn.

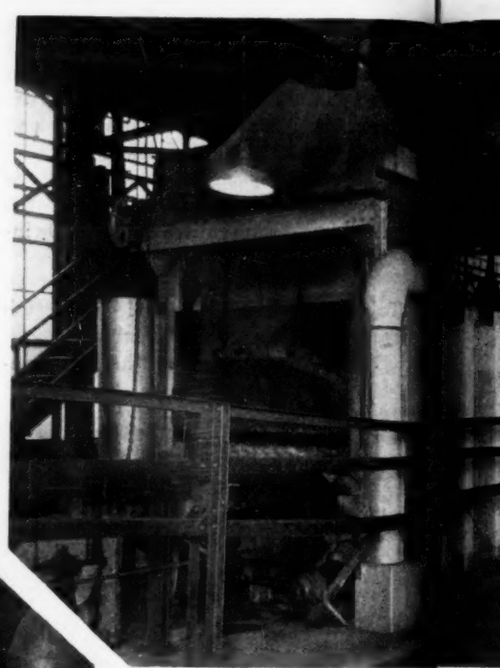
Interconnected conveyors and automatic temperature controls make this unit continuous and automatic in operation. It can be adjusted for four operations in one, such as normalizing, heating for hardening, quenching and drawing, or it can be divided so that one class of work can be annealed or normalized while another is being hardened and drawn.

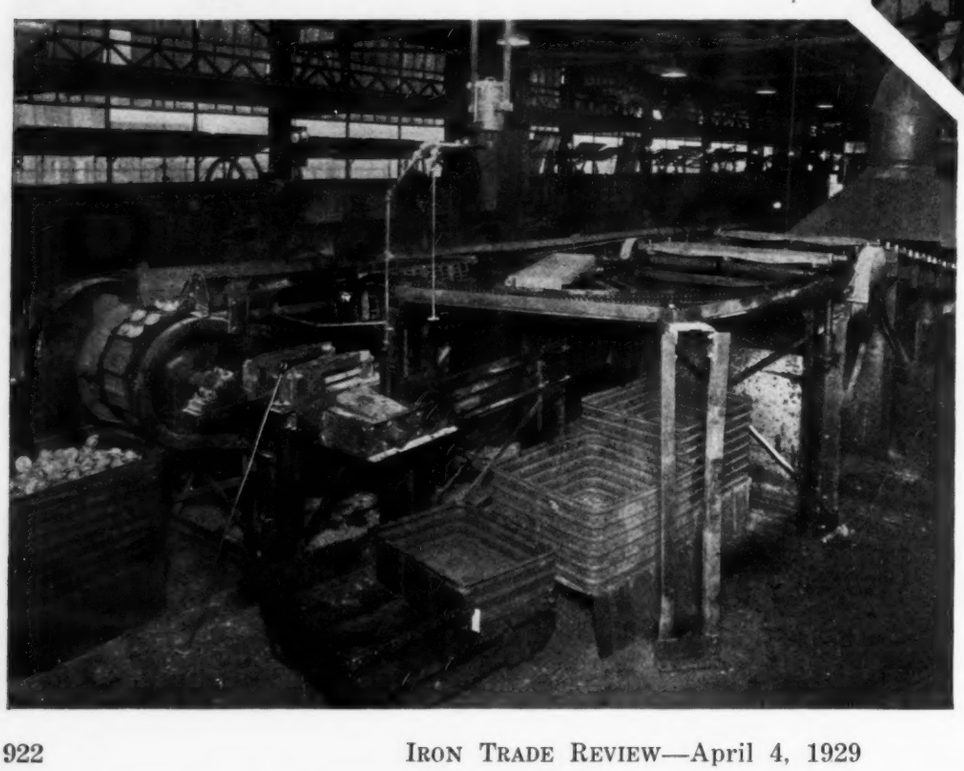
All sizes of work from small forgings to large axles can be treated interchangeably by altering the time cycles and temperatures of the various units. A list of the parts being treated regularly in this installation include front and rear axles, connecting rods, transmission gears, differential driving pinions, steering knuckles, steering knuckle levers, etc. This range in size is possible due to the fact that a standard grid type tray, of alloy steel and 14 inches wide, is used to carry the work through the furnaces.

Two Operators Handle Work

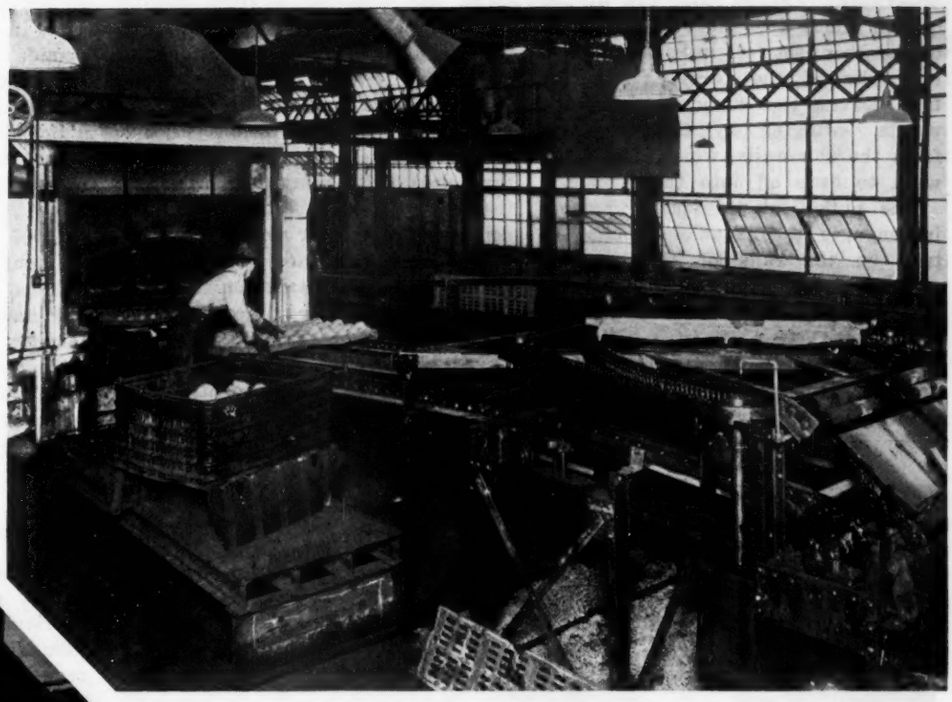
Work will travel through all three furnaces, including the quench, automatically and continuously, with the attention of but two operators, one to load the work on the trays at the charging end of the first furnace and the other to reload as the work comes out of the quench to go through the drawing furnace. The trays are returned, oriented and pass into the first furnace again without any attention whatever.

The conveyor systems at either end and between the hardening and drawing furnaces were developed by engineers of the Packard company. The furnaces and the remainder of the conveyor system were designed and built by the Surface Combustion Co., Toledo, O. These furnaces are of brick construction using 9 inches of firebrick and the same thickness of insulation and are held together with buckstays. The first is 22 feet

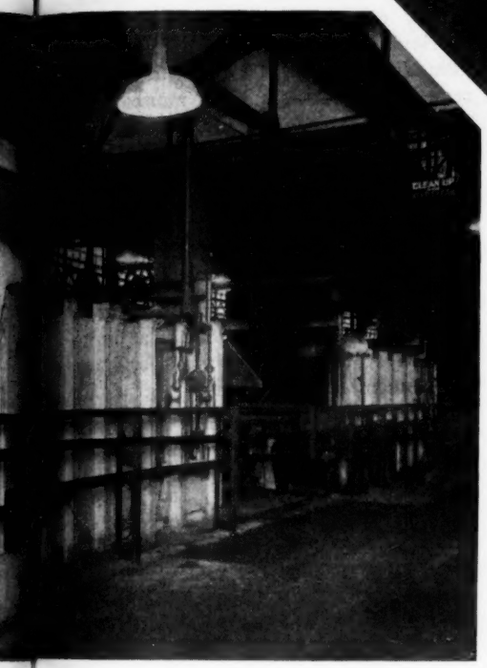




View of heat treating installation taken from charging end of normalizing furnace is shown above. Discharge end of drawing furnace, dumping mechanism and conveyor for returning trays are shown at left



Charging end of normalizing furnace, showing conveyor for turning the trays to the correct position and for dropping them into gravity conveyor which feeds them to the charging table



long and others 25 feet long. In cross section they are 6.5 feet wide and 3.2 feet high.

The first furnace has eight gas burners located near the discharge end as this is the most critical point of the heat treating cycle. These fire directly into the heating chamber. At the discharge end are located two oil burners firing into tunnels. The latter run the length of the furnace under the hearth and discharge the products of combustion through numerous ports.

The proper heat gradient is obtained by dividing the furnace into three zones, preheating, heating and soaking. An automatic temperature control is located in each; recording pyrometers also are provided. The products of combustion from the gas burners pass toward the charging end and giving up considerable heat to the cold incoming work which is conveyed in the opposite direction, thereby increasing the efficiency of the furnace materially.

The waste heat from the furnace is discharged through a vent in the roof, near the charging end, and in the vent is located a recuperator. Fresh air for combustion is forced through the coil in this recuperator, where it is heated to approximately 600 degrees Fahr. and then is delivered to the burners. The gas burners are equipped with inspirators through which the gas-air ratio is regulated. In this manner a reducing, neutral or oxidizing atmosphere can be obtained and automatically maintained.

Trays Push Mechanically

On the hearth are three alloy steel rails on which the trays of work are moved by a mechanical pusher. The latter is motor driven, through a bell crank link drive. The time the work is in the furnace is controlled through the frequency with which the pusher operates and this frequency is in turn controlled by a Stromberg time clock. At the discharge end is a mechanical puller which reaches into the furnace, engages the trunnions of the trays and pulls them forward. This is operated by the same time clock, in series with a relay to correct for the time lag between the two movements. The puller is an auxiliary to the pusher as it was not practical to put all of the load on the latter.

If the work is to be normalized only it automatically is dumped on the normalizing pan type cooling conveyor, which carries it along and then automatically discharges it, in about an hour's time, into tote boxes. The trays continue on so as not to interrupt the cycle for other work being processed.

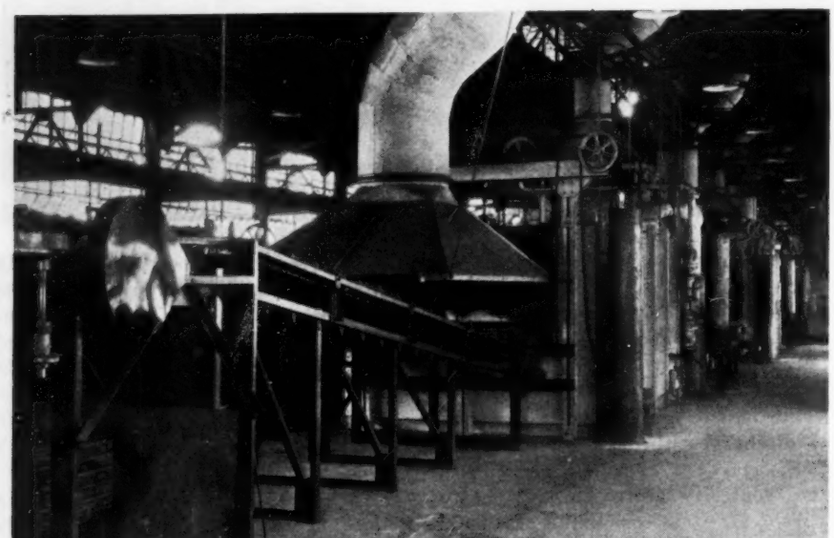
The transfer is made through a chute which drops the work directly on the normalizing cooling conveyor. In order to get sufficient clearance for a gravity drop the receiving end of this conveyor commences at a point below the floor, coming up through just beyond the chute. If, on the other hand, hardening is to follow, the trays are pushed along the roller conveyor which bridges the 22-foot gap between the two furnaces. This distance gives the work the proper cooling before entering the hardening furnace.

The hardening furnace, similar in construction to the normalizing furnace, is divided into three heating zones. The unit is controlled automatically as to temperature and is provided with the same type pusher and puller. This furnace is fired with ten gas burners and two oil burners, the two groups being located as in the normalizing furnace. At the discharge end the work is dumped through a chute into a quench tank. As in the normalizing furnace any desired heat gradient can be maintained.

The manner of dumping is unique. The trays are provided with a trunnion at each side near the advancing

end, but are supported by the rails underneath. These rails end at the quench chute and the trunnions ride on another set of rails located on the sides of the furnace. As the tray leaves the supporting rails it upsets, swinging by the trunnions from the side rails, which allows the work to drop off into the quench.

The puller, at this point, reaches in, engages the trunnions, pulls the tray on the rails of the passover conveyor, over the quench tank to the loading table of the drawing furnace and places it in position to again receive the work. The parts are brought out of the quench to this point, by a slat type continuous conveyor and an operator reloads them on trays ready for the next step.



Outlet end of drawing furnace, showing hood and pipe for exhausting fumes

The work now progresses, on the trays, through the drawing furnace, which is similar to the others with the exception that it is heated by only two burners. After the work has passed through the proper heat gradient, it is pulled on a dog-chain cooling conveyor, 23 feet long. Finally the tray is dumped and the work drops into tote boxes for removal to the cleaning room. The conveyor then makes a turn with the tray and upsets it on a single strand chain conveyor, where it rides on edge and between two guide rails. This conveyor runs the entire length of the three furnaces and delivers the tray on a turn around conveyor located in front of the charging end of the normalizing furnace.

This turn around conveyor consists of two parallel traveling chains with slats between. The tray, as tipped over on this conveyor, lies flat but with the trunnions pointing to the rear. To correct its position the conveyor makes a complete turn and drops the tray on a short gravity conveyor which feeds it to the loading platform of the normalizing furnace.

All pushers and pullers for this installation are interconnected and can be operated either from the same time clock, with relays to correct for the different time intervals, or independently by other clocks, if simpler heat treatments are desired. So flexible is this installation that the furnaces can be used interchangeably for a wide range of heat treatments. For instance, the hardening furnace can be used for non-quenching work by closing the chute to the quench tank. When this is done, the trays and work are pulled directly on the passover conveyor and thence to the drawing furnace where the pusher engages it. In this way the heat treating cycles can be varied and any combination of furnace operation can be synchronized into progressive, straight line production.

The rear axle shaft is treated in all three furnaces. This is a chrome-molybdenum steel (S.A.E. 4135) and is normalized at 1600 degrees Fahr. for one and a half hours, heated in the hardening furnace to 1525 degrees Fahr. for the same period, quenched in water and drawn at 1040 degrees Fahr. for half an hour. This gives a tensile strength of 125,000 pounds per square inch, a yield point of 100,000, an elongation of more than 13 per cent in 2 inches, a reduction of area of 52 per cent or over and a brinell of 286-321.

The front axle, which is of S.A.E. 1040 steel, is hardened and drawn only, the hardening heat being 1500 to 1525 degrees Fahr. and the draw at 1000 to 1025 degrees Fahr., with a water quench in between. This gives a tensile of 95,000 to 100,000 pounds, a yield point of 80,000, an elongation of 18 per cent plus, a reduction of area of 52 per cent up and a brinell of 228-262. The side gears, differential gears, spider, etc., are normalized only and then air-cooled. These are of S.A.E. 2315 steel and are heated to 1600 degrees Fahr. which requires an hour and a half.

Since all uncertainty has been eliminated by the automatic maintenance of perfect combustion, uniform furnace atmospheres, exact time cycles and the required heat gradients, the quality of product has been gratifyingly uniform.

Free Courses Offered

By arrangement with graduate school, college of engineering, engineering experiment station and the Columbus branch, United States bureau of mines, and a number of donors, several fellowships for graduate study in engineering are available at Ohio State university. The fellowships are awarded to holders of bachelors' and masters' degrees. Holders are exempt from all fees except matriculation and diploma and are required to do no teaching. Research, including thesis, constitutes a large portion of the required work and are supplemented by approved graduate courses. Ordinarily one year's residence is sufficient to enable a fellow to obtain a master's degree. Holders of fellowships may apply for renewal at the end of each year and are encouraged to work for a doctor's degree. The stipend for the school year, nine months, is $750. Additional information and application blanks may be obtained from dean, graduate school, Ohio State university, Columbus, O., for donored fellowships and from director, engineering experiment station, Ohio State university, Columbus, O., for industrial fellowships.

Employes Get Stock

Employes of the Inland Steel Co., Chicago, received 29,557 shares of Inland common stock April 1 in the sixth distribution of stock under the employes' savings and profit sharing pension fund. More than 1000 employes received stock certificates under the distribution, which has been in operation for ten years. Since the start of the fund 72,815 shares have been distributed. Participation in the fund is voluntary. More than 6000 employes, or about 77 per cent, are enrolled.

Machine Production Methods Lifting Civilization to Higher Plane

More Benefits Than Evils Result from Mechanization—Transitory Problems Will Be Solved

By Magnus W. Alexander

President, National Industrial Conference Board

MACHINE methods are but an expression of man at this age, reflecting his mastery of the material world, enabling him to free himself from burdensome toil and to address himself with more leisure to things of the spirit. This is the viewpoint taken by the president of the national industrial conference board, trained in business administration, and an experienced observer of trends and developments in basic industries.

Mr. Alexander's address before the Ohio chamber of commerce, Columbus, O., March 23, of which the accompanying article is an abstract, shows that he is not unmindful of those who may suffer through the processes of evolution, though he disagrees with all who claim mechanization is tending to degrade workers. "No human progress has ever been accomplished but that some individuals have not suffered by it," he states. "The machine may bring unemployment to some, for a time. An invention by necessity always makes some things obsolete. Without that, progress cannot be had. Let us remember and adequately care for those whom progress may sweep aside."

MACHINE production not only has proved a powerful factor in lifting the level of our economic or purely material existence, but machine economy has increased our margin of leisure for the pursuance of social and cultural pursuits.

An important consideration to be taken into account is that mass production lowers unit production costs and thus tends to lower prices, and that therefore demand for a given product may increase out of all proportion to population-increase as mass production enters an industry. Thus with the increased demand for production frequently no displacement of labor takes place following the introduction of improved technological methods. This is true particularly in the newer industries, which are less hampered by old established customs of procedure and old fashioned equipment. An outstanding example is the automobile industry, which now requires less than one-third the number of workers to produce a given number of cars than it did in 1914, but which in spite of the increased cost of materials used and in spite of the higher wages paid now sells better cars at lower prices than in 1914. It is the outstanding characteristic of the increased mechanization of industry that the manufacturer thereby is enabled to do four things: Increase output, pay higher wages, reduce working hours and increase the total net profits, as well.

We have experienced a distinct lifting of the economic or purely material level of our existence through the machine, that is through the mechanization of industry and its concomitant, mass production. To what extent engineering ingenuity in the future may eliminate the need for hand labor is problematical. Whether mechanization and standardization in all lines of activity will eventually outstrip the capacity of industry and commerce to reabsorb those momentarily displaced by new machinery is a fascinating problem which we cannot at this time answer; although we must be prepared to deal with it in the future.

Machine Is Target of Criticism

As from the industrial and economic so from a social and cultural viewpoint also much criticism has been leveled at the machine. For instance, as an example of its harmful effects on social life is cited the congestion in industrial centers and the social evils attending it. I will pass up the fact that still worse conditions of congestion might have been found in large population centers at a time when no machine-industry existed.

Machine production requires power; its object is mass production. By virtue of these two factors, mechanization of industry in the past has tended toward centralization of industry around or near the sources of power. Interlocking electrical superpower systems, one of the most important recent developments of our machine civilization, however, tends to decentralize industry, by allowing it to locate it more conveniently in respect to other factors affecting business economy.

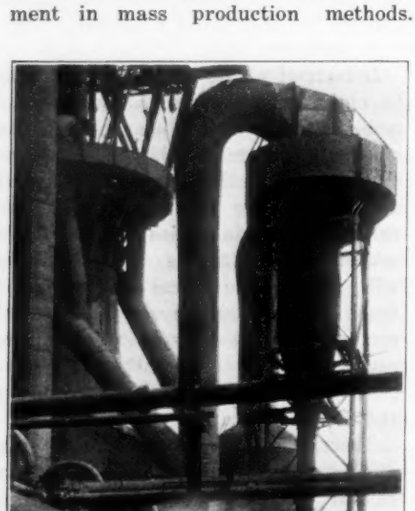
Industrial plants in the future, able to obtain their power anywhere are more likely to settle near the source of their raw material, thus at once making production more economical and dissipating congestion in our present industrial cities and the evils accompanying it. As industry thus will invade the rural sections, for much of industry's raw material comes from the farm it will help to counteract the evils attending congestion in cities and also to improve the farmer's status.

Thus machine civilization, while during a transitory stage it may have caused congestion of population and the evils implied thereby, is evolving its own salvation. Improvement in social conditions will come through the rationalization of industry, through the further perfection and application of power and machinery rather than through social legislation and the activities of professional reformers, means which seldom have the desired effect but always prove expensive to industry and thus, in-

directly, to the workers and society at large.

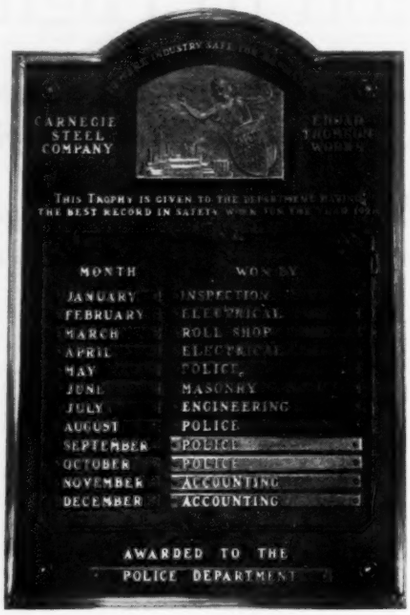
Another criticism directed at the machine is the claim that it has transformed skilled work or craftsmanship into unskilled, dull and monotonous work, thus tending to degrade the mental and social caliber of our working population. I contend here that to a great extent the opposite is true. To be sure, there is much drudgery in connection with machine production; but, if we wish to be frank it is also true that a large portion of our population, of the population of any country for that matter, is by nature so endowed as to be capable of doing only simple work. In their case, mass production requiring only simple, repetitive motions on their part, has in actuality proved a boon, for, as we have seen, the machine has raised their production and earning capacity and has lessened their hours of work, thus contributing to their comfort, standard of living and to their chance for economic progress as well. To tend the highly complicated machines of our present age on the other hand, requires many men who are well trained, alert and intelligent, for they must be able to care for this machine and tool equipment which often represents enormous capital outlay; they must have the ability to design, construct, test, install and operate these mechanisms and keep them in repair.

Indeed, beauty and art in industry is a significant characteristic development in mass production methods.



Collector which daily entraps 25 tons of flue dust in the dry state

Employes Make a Safety Trophy; Work Hard To Win It



THE Edgar Thomson Works of the Carnegie Steel Co., Braddock, Pa., places a safety trophy in competition among its various departments, and it has proved to be an important factor in reducing accidents. The 1928 trophy was designed by employes, and cast in the plant's foundry. Every man was given a chance to assist in making it. For this reason it has a sentimental interest, and the competition to win it was keen. The trophy is 18 x 24 inches, of cast bronze, on an oak panel. It was won for permanent possession by the police department.

Flue Dust Is Removed by Centrifugal Action

A centrifugal principle is involved in cleaning blast furnace gas with the vortex-type collector. The latter is installed in the gas cleaning system after the primary dust catcher and is capable of removing finely divided dust particles in the dry state from the gas stream. This is desirable where water is at a premium or in cases where it is found necessary to avoid stream pollution.

Upon entering the collector, the gas is passed to a volute casing and into a convolute spiral. The unit is designed to promote stream line flow. Effort has been made to reduce turbulence and eddying in the gas stream. Since the cleaning apparatus is designed for promoting stream line flow, the pressure drop through the collector is low. At the base of the collector the direction of the gas flow is reversed. The dust particles are removed by the action of centrifugal force and their discharge from the system is affected at the point at the base of the collector where the direction of the gas flow is reversed. At a plant in the Great Lakes district a collector furnished by H. A. Brassert & Co., Chicago, is entrapping 25 tons of dry dust per 24 hours, 16 per cent of which passes through a 300-mesh screen.

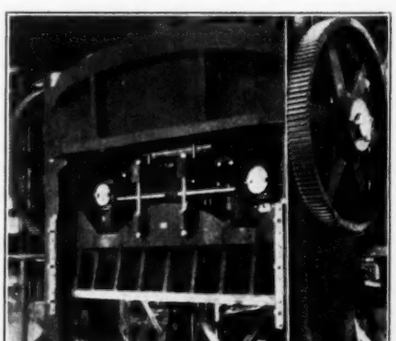
Automotive Industry Gets Two Large Presses

Midland Steel Products Co. has installed a new 2000-ton capacity press for forming automobile side rails at its Detroit plant. A duplicate of the press, which is the largest of its kind ever built, is being constructed for the Cleveland division of the company.

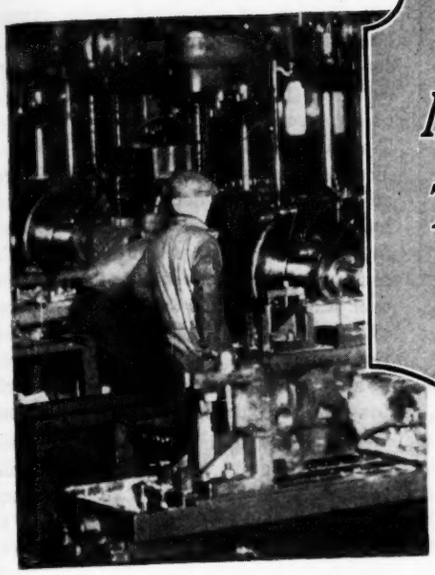
The presses were designed specially by the company in co-operation with the builders, The Hooven, Owens, Rentschler Co., Hamilton, O. They will make possible the forming of two side rails at a time and each has a productive capacity of 720 side rails or 360 frames an hour.

The unusual proportions of the presses are indicated by the fact that the weight of the slide is 45 tons, the arch 70 tons and the bed 90 tons. The entire weight of each press is 400 tons and the overall height 33 feet. The bed of the press is a one-piece casting.

Mayor Schwab of Buffalo, has vetoed a city council resolution calling for an investigation of New York state barge canal rates.



One of Midland Steel company's new 2000-ton press for frame fabrication



New Machine Tools and Shop Equipment

"Without tools man is nothing, with tools he is all."—Carlyle

Adopting New Standard Price Book

ANNOUNCEMENT has just been made that through the joint efforts of the Associated Machine Tool Dealers and National Machine Tool Builders' association, a new price book and price sheet standard is now to be installed. Both groups have taken favorable action and a committee has worked out the details of the standardization and the mechanics of its adoption. Manufacturers of products regularly sold by a machine tool dealer have been urged to prepare promptly price sheets of their products on the new sheet form. It is the hope to make the new system effective by June 1 of this year.

The maximum type page permitted is 6⅝ x 10⅛ inches and the placing of this page on the front of the sheet is ⅜ inch from top and right side, ½ inch from bottom and 1½ inches from left side. Smaller type pages may be used. The new style of price sheet also will be supplied to foreign representatives, the inference being that it will be as easy for the foreign representatives to change their binders as it is for the domestic agents.

A few machine tool dealers have expressed themselves as favoring the new size price books, provided the electrical manufacturers can be persuaded to punch sheets so that they will fit the new book. On the other hand, a number of dealers stated that they did not wish to carry motor prices in these books. However, the Associated Machine Tool Dealers are at present working on what might be called "composite motor price sheets," which would contain prices and specifications of all of the motors and controllers such as would ordinarily be required by the machine tool industry, on not more than five sheets of new 8½ x 11-inch size.

Some months ago the National Machine Tool Builders' association under-

(*Concluded on Page* 929)

Iron Trade Review's Calendar of New Equipment

Item	Comment	Builder	No.	Date Described	Page
Screwnail	For fastening sheet metal and wood; driven in	Parker-Kalon Corp.	48	March 7	651
Crank grinder	Work need not be removed to grind crankshaft pins	Landis Tool Co.	49	March 7	651
Generating set	Diesel engine connected to 40-kilowatt generator	Buda Co.	50	March 7	651
Drill	For drilling, burring or countersinking; dial plate feed	Kent Machine Co.	51	March 7	652
Acetylene generator	Used with low or medium pressure welding blowpipe	Oxweld Acetylene Co.	52	March 7	652
Clutch	Automatic and mechanical accelerating type	Worcester Polytechnic institute	53	March 7	652
Magnetic probe	To remove steel particles from flesh or eyes	V. Mueller & Co.	54	March 7	652
Grinding machine	Universal type with reversible wheel stand motor	Brown & Sharpe Mfg. Co.	55	March 7	653
Grinder	Swing frame type for foundry snagging work	Kinney Iron Works	56	March 7	653
Pouring device	Hand operated; ball bearing equipped	Modern Pouring Device Co.	57	March 7	653
Grinders	Small high-speed units; bench or floor types	Kling Bros. Engineering Works	58	March 14	719
Crane	Improved lubrication; numerous safety features	Whiting Corp.	59	March 14	719
Tractor crane	Increased flexibility and greater capacity	Otis Engine Corp.	60	March 14	720
Nut tightener	Auxiliary clutch said to prevent ratcheting and jerking	Independent Pneumatic Tool Co.	61	March 14	720
Hoist	Mounted on 5-ton truck; gasoline motor drive	American Hoist & Derrick Co.	62	March 14	720
Gear cutter	Hypoid head handles gears 60 inches in pitch diameter	Gleason Works	63	March 14	720
Milling machine	Provided with combination power and manual feeds	Kent-Owens Machine Co.	64	March 14	721
Feed pusher	For high speed handling of stock to screw machines	Eastern Machine Screw Corp.	65	March 21	793
Welding torch	Simultaneous operation of valves admitting gas and air	St. Paul Welding & Mfg. Co.	66	March 21	793
Air heater	For recovery of waste heat in stack gases to preheat air	Shaw-Perkins Co.	67	March 21	794
Grinder	Portable pneumatic type with multivane motor	Ingersoll-Rand Co.	68	March 28	858
Electrode holder	For metallic arc welding; copper jaws prevent sticking	Lincoln Electric Co.	69	March 28	859
Die head	Floats on shank, permitting self-centering on stock	Landis Machine Co.	70	March 28	859
Grinder	Air-operated, light in weight; close speed control	Buckeye Portable Tool Co.	71	March 28	859
Grinder	Pneumatic; for grinding metals of high tensile strength	Rotor Air Tool Co.	72	March 28	859
Grinding wheel	Four abrasive segments mounted in 11-inch wheel	Blanchard Machine Co.	73	April 4	928
Die punching press	Built with six punches and dies, individually operated	Zeh & Hahnemann Co.	74	April 4	928
Wire reel	For use with cable or wire rope stranding machines	Pittsburgh Producers Supply Co.	75	April 4	928
Switches	New line of master and limit switches, cam operated	General Electric Co.	76	April 4	928
Pipe machine	Duplex 12-inch type; designed for oil field work	Bignall & Keeler Machine Works	77	April 4	929

Four Abrasive Segments on Grinding Wheel

No. 73

Blanchard Machine Co., 64 State street, Cambridge, Mass., has developed an 11-inch segment wheel for use on its No. 10 grinder. The segment wheel consists of a chuck body machined from a solid steel forging, four abrasive segments with rounded ends, two fixed partitions or abutments secured in the chuck body, and two clamping units made up of shoes fitting the ends of the segments and expanded by a wedge and screw.

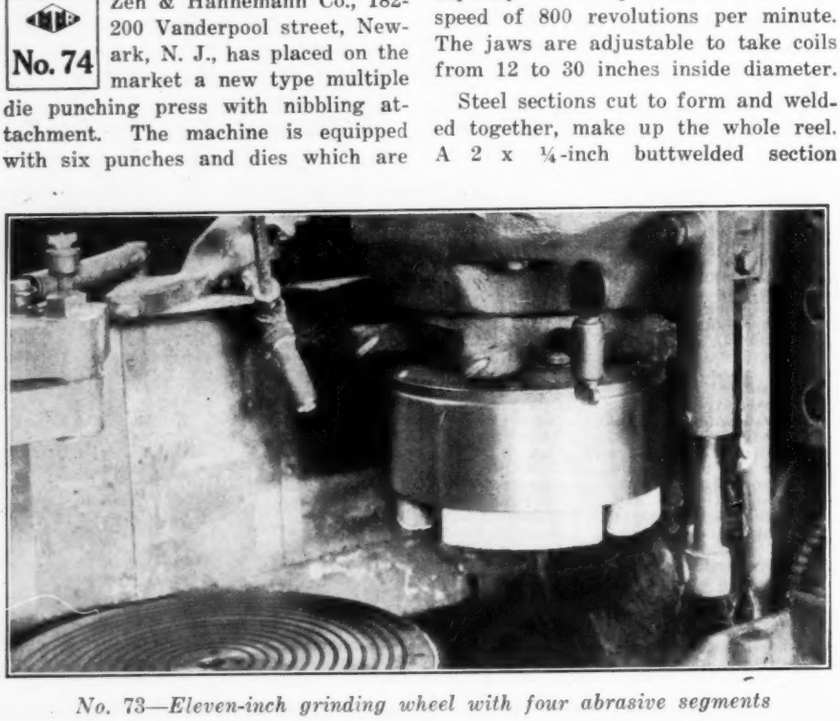
No backing plates or screws are used as the segments are held securely by the action of the clamping units which force the segments against the fixed abutments and also outward against the exterior shell of the chuck body. Adjustment or changing of the segments is effected by the manipulation of two screws.

Cadmium plating of the body makes it rust-resisting. The other parts are made of aluminum, except the screws, which are stainless steel. Abrasive segments are 5 inches deep when new and of this length 4 inches can be used. Both the segment wheel and the standard ring wheel mount on the faceplate in the same manner making it possible to alternate the two easily. The segment wheels are balanced enabling them to resist stresses in service.

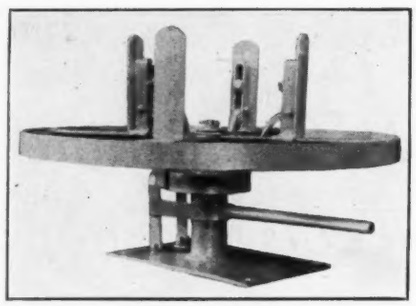
Multiple Die Punching Press Designed

No. 74

Zeh & Hahnemann Co., 182-200 Vanderpool street, Newark, N. J., has placed on the market a new type multiple die punching press with nibbling attachment. The machine is equipped with six punches and dies which are brought to individual action by pressing corresponding buttons. Diameters of the punches and dies range ¾-inch, ⅝-inch, ½-inch, ⅜-inch, ¼-inch, and ⅛-inch diameter. A nibbling punch and a die which can be inserted quickly are provided. Cutting speed is 36 inches per minute. The design permits cutting shapes and openings of any form. The punch is treadle controlled and stops automatically at the high point of the stroke. The machine has a speed of 120 revolutions per minute and weights 2500 pounds.



No. 73—Eleven-inch grinding wheel with four abrasive segments



No. 75—Wire reel adapted for use with cable stranding machine

Wire Reel Is Made of Welded Sections

No. 75

Pittsburgh Producers Supply Co., 821 Allegheny avenue, Pittsburgh, has developed a new form of wire reel especially adapted for use in connection with cable or wire rope stranding machines. The reel has overall dimensions of 36 inches diameter by about 24 inches high. It has a load capacity of 300 pounds and a rated speed of 800 revolutions per minute. The jaws are adjustable to take coils from 12 to 30 inches inside diameter.

Steel sections cut to form and welded together, make up the whole reel. A 2 x ¼-inch buttwelded section rolled to shape forms the rim. The hub consists of a plate 4 inches diameter and ½-inch gage, to the circumference of which is welded a collar of seamless tubing 2 inches high. This collar provides an abutment for the T-sections making up the reel spider. These sections, made of ¼-inch gage stock are buttwelded to the rim and hub collar, and serve to support the reel dogs. The dogs are made of U-sections formed at the bottom to fit over the upper part of the T-section of the spider. They are bolted to the removable face plate, and the whole is adjustable by means of a dog which fits in holes drilled in the T-section.

The standard is made from a piece of extra heavy 3-inch seamless tubing, welded to a heavy 20 x 20-inch flat plate, equipped with bolt holes at the corners for mounting. The center shaft is made from 1½-inch shaft steel, and is mounted in two Timken bearings, which support the whole load of the reel and spider, as well as serving as guide bearings for the shaft. A U-section, bolted to two studs which are welded to the base plate, acts as the brake rigging. The brake drum consists of a plate spider welded to the shaft, to which is welded a rolled section, to form the drum. The operating mechanism consists of a piece of seamless tubing welded to a U-section. Ends of the tubing are lapwelded to the U carrying the wooden brake shoe to which it is bolted.

New Limit Switches Are Cam Operated

No. 76

General Electric Co., Schenectady, N. Y., has announced a new line of double-break master and limit switches designed especially for use in the steel industry. Applications include skip hoists, car dumpers and other machines requiring geared-type switches. The limit switches can be adjusted by shifting, tripping and closing dogs on the cams. The contact action is of the snap action type and is latched in both the open and closed positions. This is said to give a positive action to the switch and also to allow adjustment of the operating dogs to control the contact mechanism through the entire 360 degrees of rotation. The master switches are available in three forms, the one-point, three-point and four-point. Outstanding features of the switches as listed by the manufacturer are: Double-break silver-faced contacts; freedom of contact parts from dust and other accumulations; molded insulation on cams and contact arms;

accessibility of molded terminal board for wiring; and small overall size brought about by compact design.

Duplex Pipe Machine Is New Development

No. 77

Bignall & Keeler Machine Works, Edwardsville, Ill., announces the development of a new 12-inch duplex pipe machine, designed especially for oil field work. The arbor has a bore of 15¼ inches and will handle all sizes of pipe, casing and tubing from 4-inch pipe to 13⅜-inch casing. A sliding die head can be arranged for dies of any desired width. Cutting off, beveling and reaming tools are regular equipment. Reversing for left-hand threading work and pulling collars is accomplished through the countershaft or motor which is of 7½-horsepower capacity. The motor-driven machine weighs approximately 13,000 pounds.

Corrects Identification

OWING to an unfortunate transposition of illustrations on pages 858 and 859 of the March 28 issue, the presentation of the descriptions of the pneumatic grinders numbered 68 and 72 was confusing to readers. In order to properly identify these portable tools, the illustrations are presented again on this page, with corrected captions.

—THE EDITORS

Adopting New Standard Price Book

(*Concluded from Page* 927)

took an investigation of standard machine tool colors. The committee which has been collecting data on the subject has just been supplied with some interesting statistics compiled by one of the association's largest member companies. The information is as follows:

	Number of machines	Number of different customers
October	22	5
November	6	3
December	14	8
January	7	5
February	8	4
	57	25

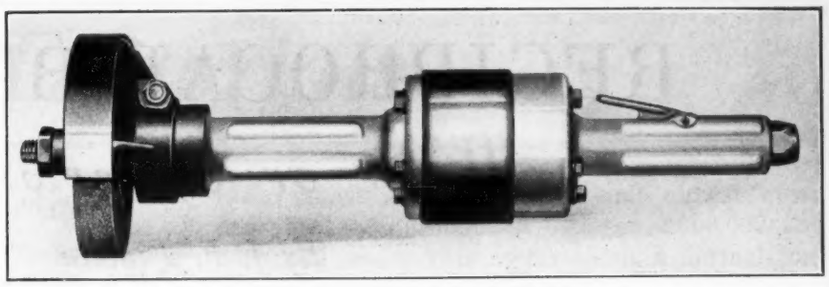
An executive of the company compiling the figures commented as follows:

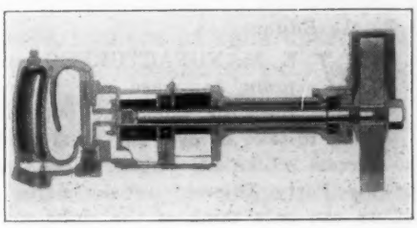
"There are a good number of special paint jobs coming through our shop which cause considerable delay and extra expense. During these five months some of the machines went to the same customers to the extent that during this time there were 16 different customers with special paint jobs. Of the 57 machines, 7 were lacquer and 50 were ordinary paint of specified colors. The lacquer jobs do not cause as much trouble as the paint jobs because it is just a question of getting the proper color for which we must keep in supplies, or in some cases, order special direct. For the ordinary paint jobs it requires two preparatory coats so that the paint will not soak through, whereas with lacquer it takes but one coat. The ordinary paint jobs require from one day and upwards to dry and do not give nearly as good a finish when completed."

In concluding, the executive said it would seem that an extra price for special paint jobs is justified and suggested $25 extra for a lacquer job and $50 extra for an ordinary special paint job.

Another subject which the Tool builders' association likely will discuss at its next convention is the "Standardization of Specification Arrangement." Buyers of machine tools have pointed out that in going over proposals with a view to selecting the best suitable equipment offered, the purchaser usually tries to pick out the points of each that will best answer his needs. Information that he considers important is not given in some of the proposals, and is not given on the specification sheet of the company whose literature is submitted to him. This causes delay in getting information. It is suggested that each group of the association could decide what kind of items should appear on all specifications covering a given type of machine; then to help the buyer and save time of the salesman, the order of arrangement of the item specified could be standardized.

Treasury department has granted a drawback on ferrotungsten manufactured by the Molybdenum Corp. of America, Pittsburgh, with imported tungsten ore or concentrates.





No. 68 (Above)—Multivane pneumatic grinder manufactured by Ingersoll-Rand Co., New York, and described in the March 28 issue of IRON TRADE REVIEW

No. 72 (Right)—Phantom view of pneumatic high production grinder manufactured by Rotor Air Tool Co., Cleveland, also described in last week's issue

Marketing Phases Will Be Discussed

"What's Around the Corner in Marketing" is a general subject matter of a meeting to be held by the marketing executive division of the American Management association, at the Hotel Gibson, Cincinnati, April 3 and 4. This will be followed by a salesman training group under the auspices of the same association, April 5.

The program provides for sessions on various phases of distribution. One session will be devoted to "Mergers and Marketing"; another to a discussion of the position of the retailer. "Marketing for Resale" and "The Wholesaler of Today and Tomorrow" will each take up a session. Another session will be devoted to discussion of the manufacturer's relation to the consumer, retailer and wholesaler.

Wage Bill Is Opposed

Opposition by Illinois industrialists to the 8-hour day and wage fixing bill with respect to public works in Illinois is being voiced by Illinois Manufacturers' association. The bill, according to James L. Donnelly, executive vice president, requires contractors on public works to pay no less than the prevailing wage schedule and to establish eight hours as the standard day.

"The most dangerous provision," said Mr. Donnelly, "is that which specifies that all material to be used on public works must have been produced at the prevailing rates of wages and under the 8-hour day in the localities in which the public work is done."

RECIPROCAL BUYING

Wise or Otherwise?

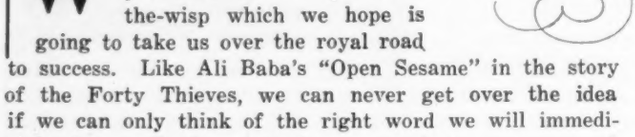
By J. F. Lincoln

President, Lincoln Electric Co.

To the Editor:

WE MANUFACTURERS are prone to chase any will-o-the-wisp which we hope is going to take us over the royal road to success. Like Ali Baba's "Open Sesame" in the story of the Forty Thieves, we can never get over the idea if we can only think of the right word we will immediately have all the obstacles removed to success and fortune. This wish-thinking takes the form of various unsound schemes which because of their preliminary success seem to be the final answer to this happy condition.

From the fountain of youth sought by De Soto, through



"Reciprocation" is no business synonym for "Open Sesame"

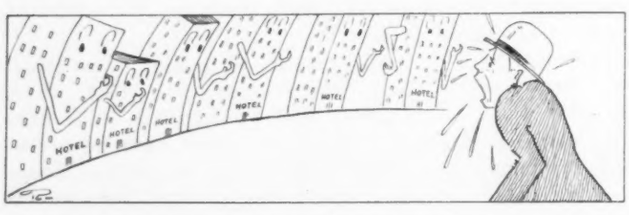
the East India company, down to trusts that throttled competition by cutting prices, and on to Ponzi. We have been following this vain hope only to meet the same disappointment and chagrin.

We have now gone to the latest triumph of business management known as "reciprocation," which is the very logical and rather obvious idea that if I buy something from you you are under obligation to buy something from me. In fact, if you don't buy something from me I am going to quit buying from you. Some of the large corporations have adopted the policy to the point where every order that is placed has to be split up among a number of manufacturers regardless of whether the product of other customers is what they actually need and want.

* * *

THE American manufacturer is manufacturing practically entirely for home consumption. The question then is merely whether it is possible by this scheme for anyone to get a larger part of the business than he got before.

It is self-evident that if this policy continues each manufacturer can force his suppliers to buy his product. In the final analysis, however, it is absolutely impossible for any of us to get any larger share of the business than we got before, since each can force his suppliers, in general, to buy from him; at least in proportion to his purchases, so that the final answer is exactly the same as before. We each get the same share of business as we are now getting.

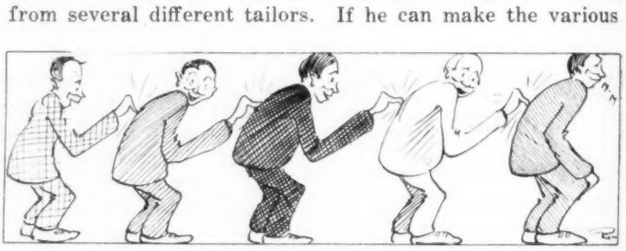


The dyed-in-the-wool reciprocator who sells bath tubs to hotels

If this were the only result there would be no objection to this rather childish policy. However, the situation does not work out that way. If I am to adopt this scheme and I want to buy three lathes, I must at least buy them from three different manufacturers. The railroads must buy from all those who ship freight over their lines.

* * *

AS PRESSURE is put on, diversification of purchases must become greater, and we will finally get to the place where if a "reciprocator" wishes, for instance, to go to another city it will be necessary for him to spend the night in at least eight different hotels, spending perhaps one hour in each one, eating each course of his dinner in a different dining room, and buying his clothes from several different tailors. If he can make the various



The dissenter views reciprocation as a refined form of "backscratching"

garments match under these conditions no great harm will have been done but what will happen if the coat and "trou" don't look alike?

By adopting this policy of reciprocation the companies doing it must make up their minds that they will sacrifice the following advantages:

First: Of getting what they want.

Second: Of getting it at the best price.

Third: Of being able to put pressure on to their suppliers for service, quick delivery, or information.

Each manufacturer spends a very appreciable amount of money to be able to get these advantages in dealing with his suppliers, but since "reciprocation" means that I will buy from you because you buy from me it eliminates the present more satisfactory method on which most of us do our purchasing—that "I will buy from you because you are the best supplier of what I want that I can find."

This present situation is, of course, merely a passing

(*Concluded on Page* 932)

Editorials

Using Color in Industry

WHEN color first began to make an impression in the retail markets few, if any, observers foresaw the possibility of color becoming a factor in industry. Yet today there are definite indications that the power of bright hues is being recognized in the broad field of industry.

Elsewhere in this issue is a brief announcement of the policy adopted by the Hay Foundry & Iron Works, New York, of painting structural steel fabricated by the company a bright yellow, which gives the framework of a building thus painted a most striking appearance. This not only calls attention to the steel framework, but also helps to identify the fabricator.

In a bulletin just issued by the National Tube Co., Pittsburgh, a new policy of marking copper bearing steel pipe is announced. The company states that "a clear and unmistakable means of identification has several advantages, particularly in that it avoids confusion in jobbers' stocks, contractors' stocks, and while workmen are handling it on the job."

Therefore, the company states, in addition to the usual markings, all sizes above ¾-inch are marked with a distinctive green paint. Black pipe is marked by a coat of green paint on the entire outside surface. As pipe exposed to the atmosphere usually is painted, this preliminary coat has a definite value outside from the purpose of identification. Galvanized pipe has two stripes of green running lengthwise and diametrically opposite to each other.

To the company executive possessing active imagination these two examples suggest broad possibilities for the use of color in industry. There is no question but what attractive markings have a potential value that thus far has been overlooked by many manufacturers of industrial products.

Steel Rail Market Stabilized

PASSING of the era of railroad construction and establishment of a steady replacement of existing lines, to care for wear and tear or to bring about betterment, can be read in the statistics of steel rail production in the United States, as compiled by the American Iron and Steel institute.

For about a decade and a half almost every year has seen production between 2,000,000 and 3,000,000 tons. This seems about a normal tonnage to care for replacements.

One of the leading indications of present statistics is the lessened tonnage of rails under 100 pounds per yard and the increase of rails weighing more than that figure. Rails weighing from 100 to 120 pounds per yard and those weighing over 120 pounds both show an increase in 1928 over 1927, while all less weights show a decline in tonnage.

This is another sign of the times in railroad practice. Tracks on which most replacment is necessary are those to which the heavier sections offer most value and they are given increasing use.

Trend toward alloy-treated rails has been marked. A larger tonnage was rolled in 1928 than in any year except 1919 and 1920. In this class also rails of more than 120 pounds per yard predominated heavily. Thus the figures show that railroads are meeting heavier traffic demands by larger sections and tougher steel, to carry much larger power and container units and more frequent service.

Producers of steel rails have a fairly steady market and one not susceptible to much enlargement, since railroads are the only customers, except for relatively small tonnages for mine and logging work. Variations from year to year are relatively slight and the price is stable. The worth of such a market is great and is prized accordingly by steel producers.

Miners Get Two-Year Object Lesson

TWO years ago April 1 the United Mine Workers of America declared a strike in the bituminous coal fields of western Pennsylvania. Thousands of miners quit their jobs, and prepared for a bitter struggle with the coal companies which were unable to continue paying them the high wages they had been receiving. Developments of the past two years must have proved an object lesson to the miners, for today they are back at work, peaceful and happy again, and all apparently satisfied with the outcome, except the leaders of their organization, who have lost much caste.

When the miners went out they sacrificed their rights to live in company houses, and they sought

shelter in barracks built by the union. A year ago a committee of the United States senate visited the coal fields of western Pennsylvania and found many families starving, and nearly freezing, loyal to the last to their union. They would not return to work at the wages the companies could afford to pay them, and they could not subsist on their own resources or those of the union.

Finally the word was passed from the strike leaders to "find work wherever you can," and one by one the miners drifted back. The strike was not called off officially, for no publicity was desired for their defeat. But the miners were glad to resume work, and as they are skilled, the companies preferred to have them to unskilled, temporary labor.

The barracks were abandoned, the company houses once more became tenanted, coal production increased. There was no longer need for hundreds of special police and deputies to guard property against vandalism. Today the miners are working and living contentedly. With the trouble-making element removed, they are getting along first-rate with their employers. An investigator after spending some time in the district reports the miners are not receiving as much as they did before the strike, but they are living in comfort, and are satisfied.

A Tax on Every Kitchen

ON MOST phases of the tariff there is ample opportunity for honest difference of opinion. Whether a man be a producer or consumer of raw materials or finished products which are obtainable in both domestic and world markets naturally colors his viewpoint.

But there are commodities on which it would seem there is only one tenable position. Into this category falls palm oil, one large use for which is in the tin plate industry. Ostensibly to appease the farm element the effort is being made to take palm oil off the free list and to put a stiff duty on it.

Whether soap manufacturers and other consumers of vegetable oils would turn to domestic oils remains to be seen, but for the tin plate industry there appears to be no substitute. Regardless of the duty, it would seem that the industry would require its supply of palm oil. And in the nature of things, the duty doubtless would be passed along to the consumer.

Considering the extraordinary uses to which cans are put and the important role played by the canning industry in preserving fruits and vegetables and broadening the American menu, a tax on palm oil would be a tax carried directly into every kitchen in the land.

What Our Readers Are Thinking

Difference Between Malleable Irons

To the Editor:

I FIND in IRON TRADE REVIEW of March 21, on page 780, figures 146 to 154 inclusive, dealing with malleable iron and showing as typical of the core of that material a structure of pearlite and temper carbon. I assume that the difficulty is again one of where a German conversant with the whiteheart process discusses malleable in a nation which thinks only of blackheart.

The author recognizes in the text the existence of two forms of annealing but his illustrations are all of German practice and this fact is not emphasized in the legends under the figures or very definitely in the printed matter.

It would seem of importance in an American publication to call attention to the fact that normal American iron is only ferrite and temper carbon and that the author's micrographs and explanation though correct are not applicable to American conditions.

H. A. SCHWARTZ,
Manager of Research
National Malleable Steel Castings Co.
Cleveland, March 21, 1929.

Heating with Blast Furnace Gas

To the Editor:

I NOTICED in the issue of IRON TRADE REVIEW, March 7, page 644, the article entitled "By-Product Ovens Are Underfed with Blast Furnace Gas," dealing with the economic arrangement of the Federal furnaces and the coke oven plant of the By-Products Coke Corp.

I wish to state that originally this problem of the excess blast furnace gas of the Federal furnaces and its most economic disposal was turned over to me in March. 1924. My investigations and conclusions were embodied in several reports made by me for the Peoples Gas Light & Coke Co. and the Commonwealth Edison Co., Chicago. These reports showed that the piping of the blast furnace gas underneath the Calumet river to the coke ovens, and the underfiring of same with that gas, was the most economical solution, and was afterward adopted, as described in the above mentioned article.

A. H. DYCKERHOFF, *Research Engineer.*
Chicago, March 21, 1929.

Reciprocal Buying

(*Concluded on Page* 930)

fad but as usual the results will be far from passing. It is not good business to go on the theory that what I lose in my buying from you I can make up in my selling to you. Some one is sure to be fooled.

Good will obtained from mutually profitable sales to each other is only to be expected in the usual course of business, but when purchasers send out their orders specifying that the raw material going into the manufacture of the product ordered must be bought from them, some one is going to be mistaken before the deal is completed. The "boot strap elevator" is no more efficient now than it was in our youth.

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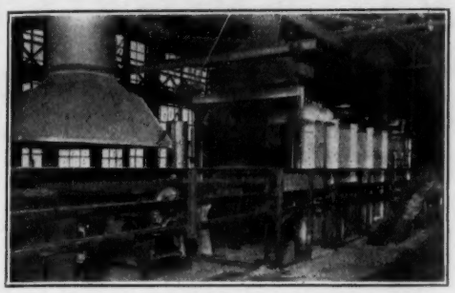

Heat Treating Unit Adjustable for Universal Operation. Page 922.

THIS issue of IRON TRADE REVIEW will serve as a complete guide for those who plan to attend the thirty-third annual convention and the exhibition of the American Foundrymen's association in Chicago, beginning April 8. It contains full details of the program of technical papers, a condensed schedule of the various sessions, and list of exhibitors. This is in addition to articles with many facts of interest and importance to the visitors. All activities of the association, including the show, will be centered in the Stevens Hotel. See issue of April 18 for full descriptive details.

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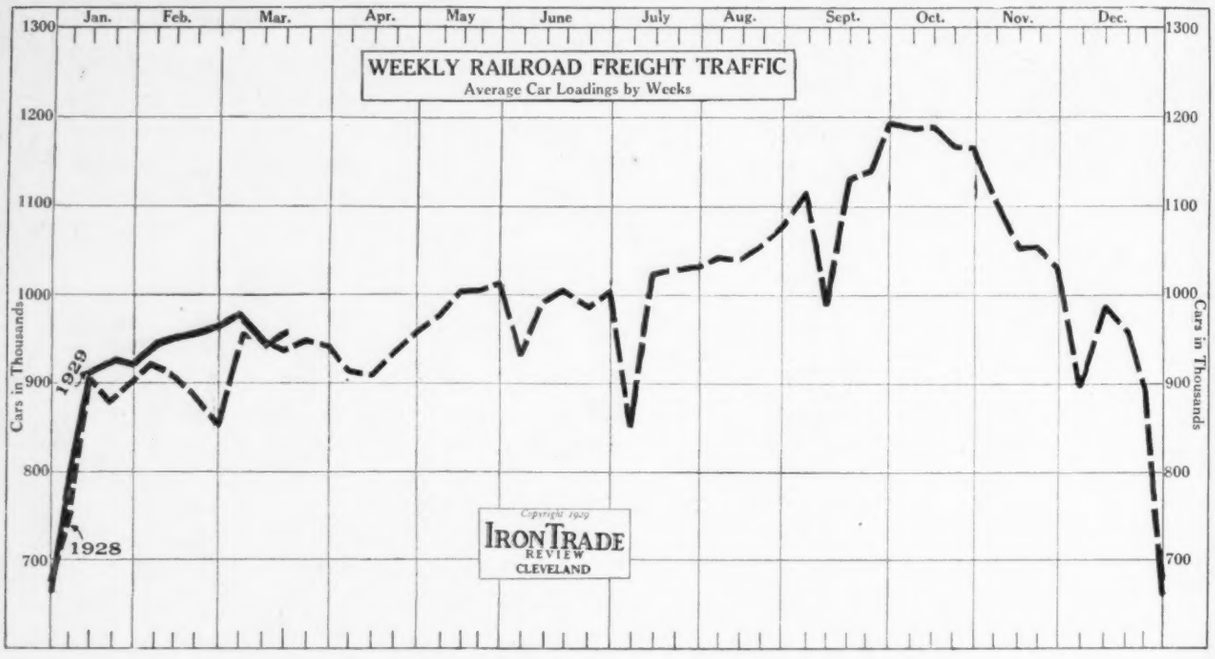
The Business Trend



Credit Situation Dominates Outlook

By JOHN W. HILL Financial Editor

DEVELOPMENTS in the credit situation continue to challenge the attention of the business community. With call money rising to 20 per cent last week and near-panic conditions prevailing in the stock market it is not possible to overlook the fact that a condition of stringent money exists. Nor is it possible to forget that such a condition in the past often has been followed by some adverse effect upon business.

IN VIEW of this fact it is worthwhile to examine some of the basic factors in the economic and financial situation. From the soaring of call money rates to the highest level since the inflationary period of 1920 it might be concluded that the general position of finance and industry was similar to that period. Nothing could be farther from the truth. In banking position itself there is marked difference.

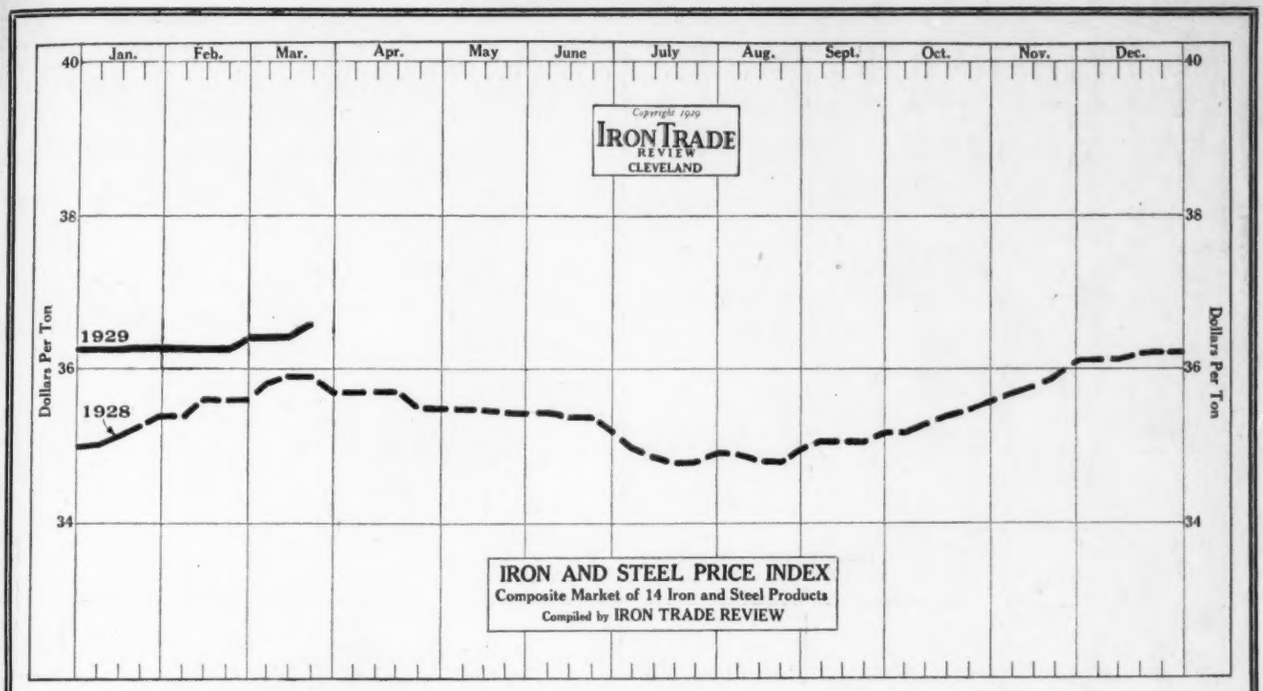
THIS contrast is seen in the condition of the federal reserve banks. Early in 1920 the cash ratio of the federal reserve system was falling threateningly near the danger line of 40 per cent. The cash ratio today is more than 71 per cent, only slightly lower than it was one year ago, when it stood at 73 per cent.

WHY then is the Federal Reserve board so intent upon checking unbridled stock market speculation? The reason is found in the fact that member banks of the federal reserve system are borrowing more than $1,000,000,000 through rediscounts compared with $524,000,000 one year ago.

THE Federal Reserve board believes that the system's credit is being piped into speculation whereas it should be held intact for commerce. A year or two ago, when the security bull market was younger, credit was cheap and abundant because of excess gold reserves. Now the country has shipped out $440,000,000 of gold.

FUNDAMENTALLY, the situation is not unsound. If excessive flow of funds into speculation is checked, as now appears probable, there will be found to be ample credit reserves for trade. Meanwhile, industry has avoided inflation of prices, and production is well gaged by demand. On the whole, the credit squeeze in the stock market does not bear anything like the threat to business that was true eight years ago. While some seasonal letdown from present levels is probable, no sharp general reaction is in prospect.

The Business Trend

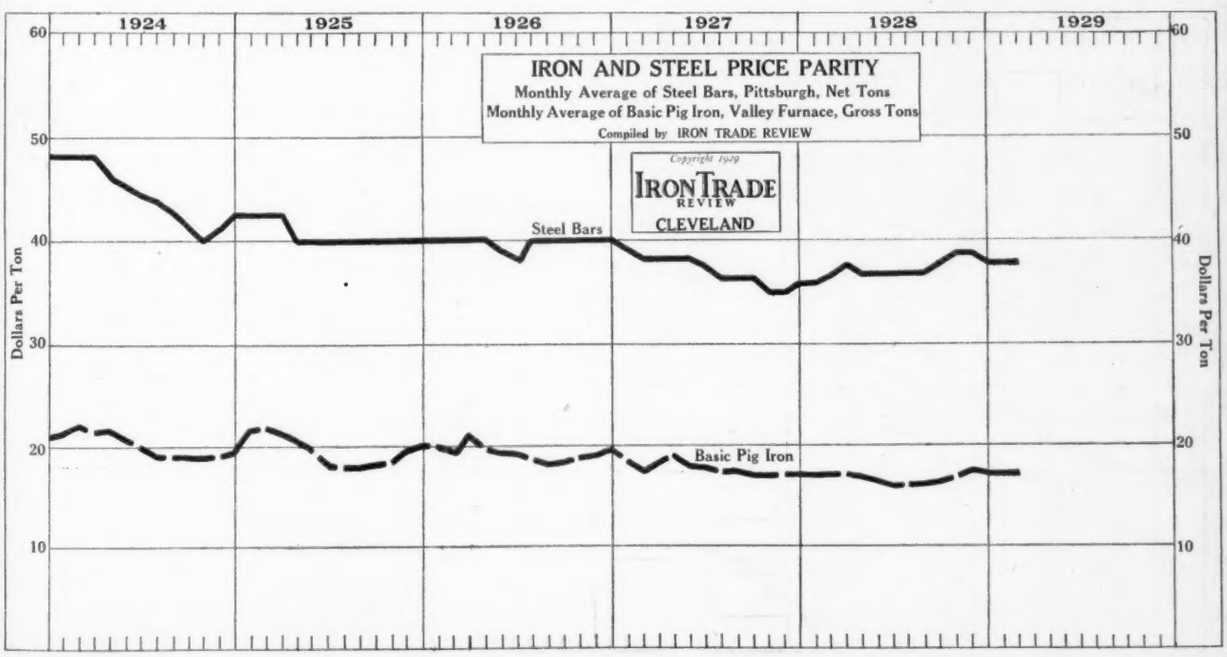


Steel Price Index

IRON TRADE REVIEW'S composite market's average advanced during the last week of March to the highest level touched in almost two years. The increase was occasioned by rising prices for pig iron and heavy steel. After standing at $17.50 for some months basic valley pig iron has been advanced to $18, and steel bars, plates and shapes to 1.95c, Pittsburgh. Although the composite average is the highest it has been in 21 months it still is only 38 per cent above the composite average of 1913.

Steel Price Parity

THE past month brought advances for both finished steel and basic pig iron with the result that the spread between these two products continued unchanged. Steel bars at Pittsburgh remained at $38 a ton during the month until the final week when the quotation was marked up to $39 a ton. Basic valley iron remained at $17.50 a ton during the month also until the last week, when it was advanced to $18 a ton. This advance for pig iron reflected good demand as well as the increase in ore prices of 25.00c a ton.



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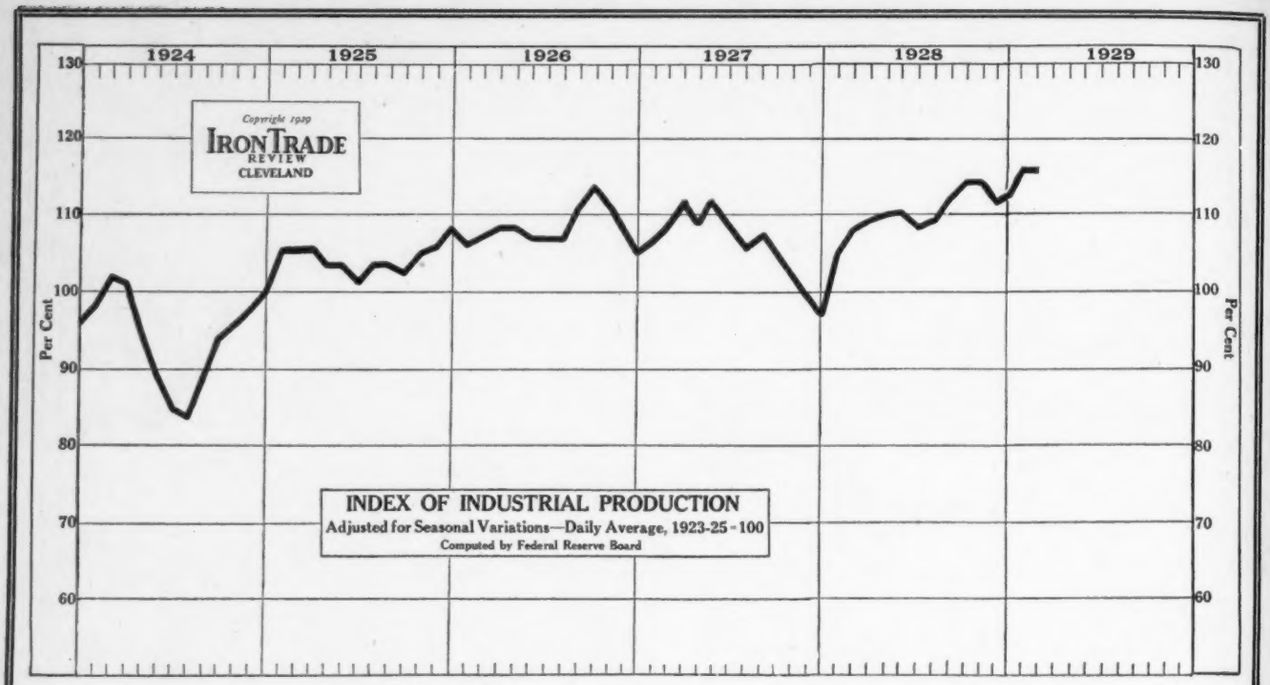
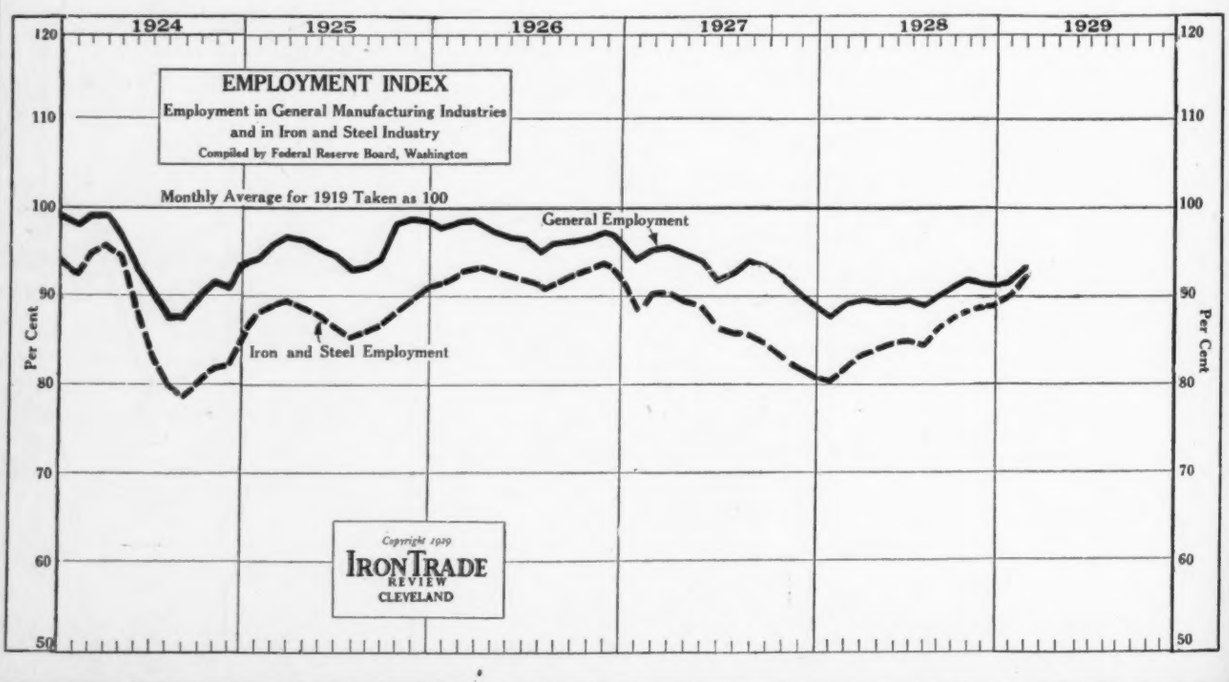


Industrial Production

INDUSTRIAL production continues at a high level, the index compiled by the Federal Reserve board at Washington standing at 116 for February, compared with the same figure in January and 104 in February, 1928. Many industries have reached new high levels of outputs, including automobile production and iron and steel and the first quarter of the year was record-breaking for these and a few other important industries. Great activity also prevails in machine tools, and agricultural implements reflect large volumes.

Employment Index

SOMETHING of a spurt has taken place in employment in the iron and steel industry. In February the index of employment compiled by the Federal Reserve board at Washington stood at 92.6 for iron and steel mills, compared with 90.3 one month before and 80 one year ago. The increased employment that has taken place since the first of the year is considerably above the normal seasonal gain. Total factory employment stood at 93 in February, compared with 91 one month before and 88 one year ago.



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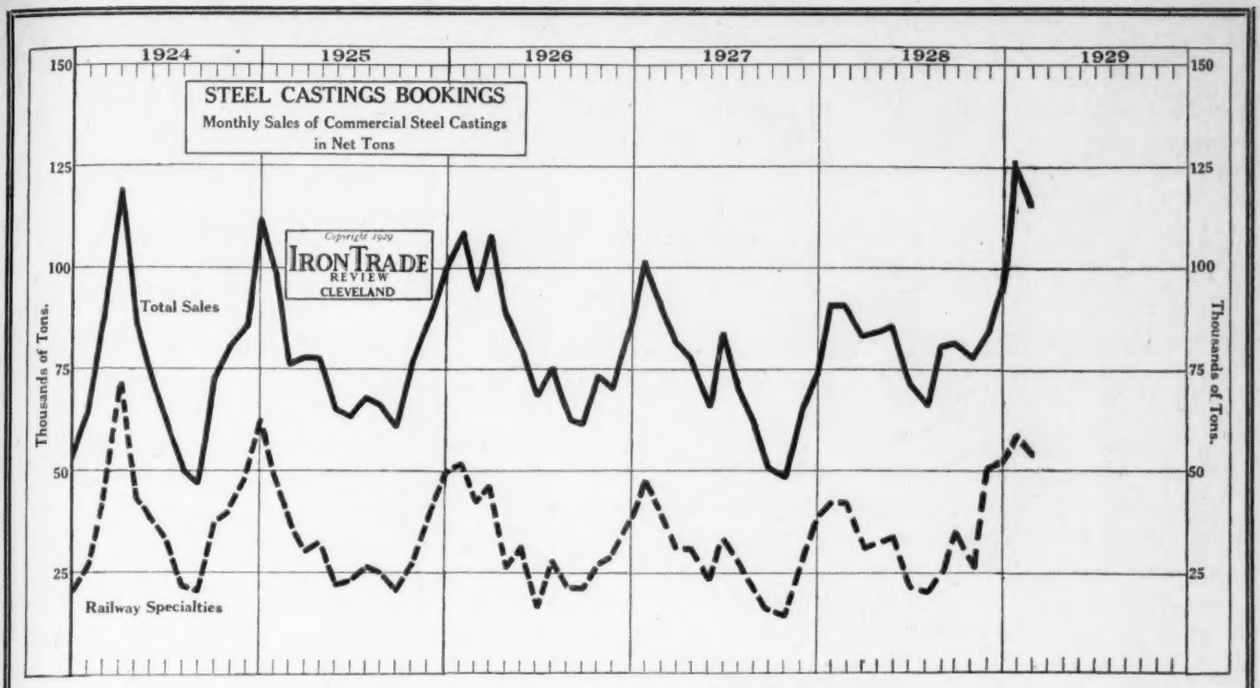
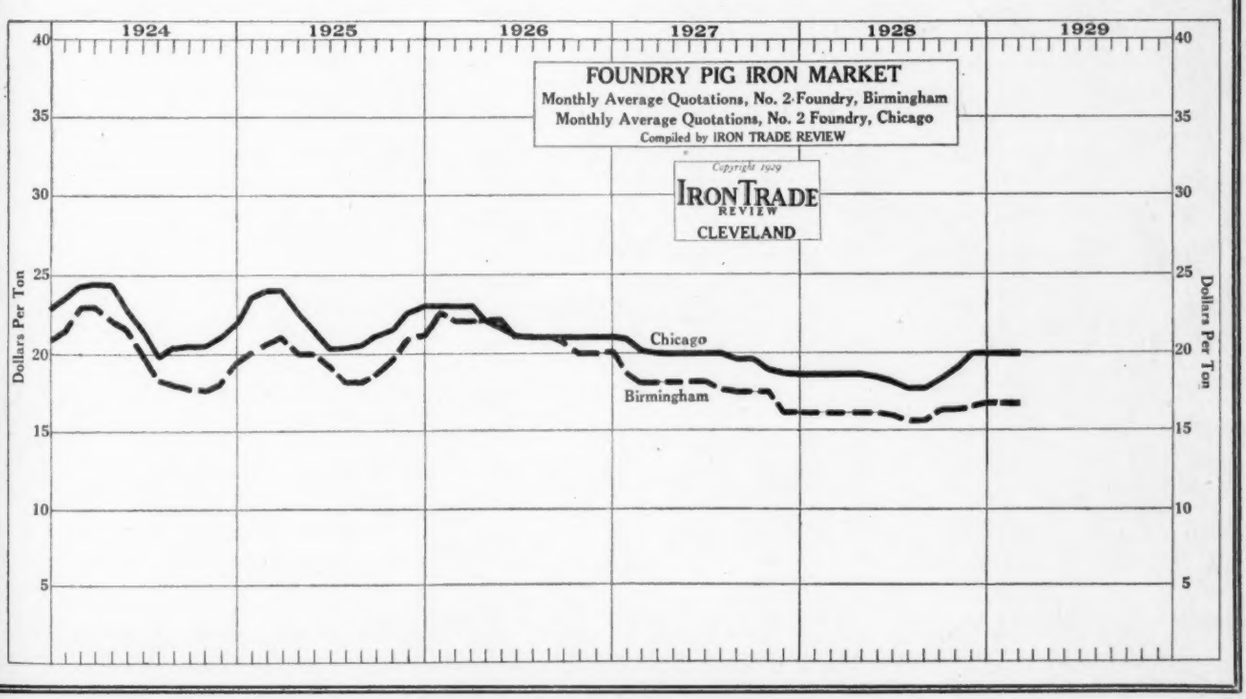


Steel Castings

NEW orders for steel castings in February as reported to the department of commerce by leading manufacturers represented 79 per cent of shop capacity, compared with 85 per cent in January and 62 per cent one year ago. Total bookings amounted to 115,539 tons, compared with 124,313 tons in January and 91,076 tons in February, 1928. Railway specialty bookings totaled 58,903 tons, compared with 64,809 tons one month before and 41,096 tons in February, 1928.

Foundry Pig Iron Market

ALTHOUGH foundry iron has been stronger in price in some districts. No. 2 foundry Chicago and southern No. 2 Birmingham have shown no increases. No. 2 foundry Chicago continued at $20 a ton during March, unchanged since the advance late in 1928. On the other hand, southern No. 2 Birmingham actually declined late in March from a quotation of $16.50 a ton to one of $15.50 a ton. Except in the South, pig iron prices continue firm or rising in most other districts.



March Pig Iron Output a Record

Net Gain of Five Active Furnaces—High April Iron and Ingot Rates Seem Assured—Some Makers Sold-up for Quarter—Ore Rise Prods Sales

PIG iron production in March, as in January and February, constituted a record for that month and was exceeded only twice in all history. At 119,575 gross tons daily and 3,706,822 tons for the month, it bettered the previous peak March, in 1925, by 1½ per cent. Over the rate of February it gained 4 per cent and over last March 16 per cent.

Gain in Stacks Wholly at Steelworks

First quarter output of pig iron, at 10,358,226 tons, also was a record, the previous top being 10,157,696 tons in the opening quarter of 1925. First quarter tonnage in 1928 was only 8,953,358. As March ended 213 blast furnace stacks were active, five more than a month previous and the largest number in blast since April, 1927.

This addition to capacity foreshadows another pig iron record in April. Also, it makes certain that statistics for steel ingot production in March, to be announced next week, will reveal an alltime peak for both the month and the first quarter. All five stacks added last month being at steelworks, the seal is placed on April ingot operations.

With three record months behind them, and a fourth in prospect, iron and steel producers in a spirit of prudence are scanning the situation more closely. At Chicago, today's stronghold of the industry, second quarter production is considered sold out, and deliveries have become further deferred. Specifications at Cleveland have come back after a slight letdown.

Weak spots in the automotive situation at Detroit are being neutralized, but second quarter assembly rates hinge partially upon the rapidity with which retail buying moves some of the overproduction of the first quarter. The Pittsburgh and eastern markets have changed little in the past thirty days. Youngstown largely mirrors the automotive situation at Detroit.

Lake Furnaces Sell Much Iron

The rise of 25 cents per ton in Lake Superior iron ore, applying on open market sales of over 2,000,000 tons and on many long-term agreements, has greatly stimulated pig iron selling in the lake region. Furnaces at Cleveland sold 65,000 tons, some for third quarter, in the past week.

Comparative Prices of Iron, Steel and Coke

Representative Market Figures for This Week, Last Month, Three Months and One Year Ago

	Apr. 3, 1929	March 1929	Jan. 1929	April 1928
PIG IRON				
Bessemer, del. Pittsburgh	$20.26	20.11	19.96	19.26
Basic, valley	18.00	17.60	17.50	16.75
Basic, eastern del., eastern Pa.	20.25	20.25	20.15	19.25
No. 2 foundry, del. Pittsburgh	19.76	19.51	19.36	19.01
No. 2 foundry, Chicago	20.00	20.00	20.00	18.50
*Southern No. 2, Birmingham	15.50	16.00	16.50	16.00
**No. 2X, Virginia furnace	20.75	21.00	21.25	20.50
**No. 2X, eastern del. Phila.	22.26	22.26	22.26	21.26
Malleable, valley	18.50	18.10	18.00	17.25
Malleable, Chicago	20.00	20.00	20.00	18.50
Lake Superior charcoal, del. Chicago	27.04	27.04	27.04	27.04
Gray forge, val., del. Pittsburgh	19.26	19.11	18.76	18.56
Ferromanganese, del. Pittsburgh	109.79	109.79	109.79	104.79
*1.75 to 2.25 silicon. **2.25 to 2.75 silicon.				
COKE				
Connellsville, furnace, ovens	2.80	2.95	2.75	2.60
Connellsville, foundry, ovens	3.75	3.75	3.75	3.65
SEMIFINISHED MATERIAL				
Sheet bars, open-hearth, Youngstown	35.00	35.00	34.00	32.75
Sheet bars, open-hearth, Pittsburgh	35.00	35.00	34.00	34.00
Billets, open-hearth, Pittsburgh	34.00	34.00	33.00	33.00
Wire rods, Pittsburgh	42.00	42.00	42.00	44.00

	Apr. 3, 1929	March 1929	Jan. 1929	April 1928
FINISHED MATERIAL				
Steel bars, Pittsburgh	1.95	1.90	1.90	1.85
Steel bars, Chicago	2.05	2.05	2.00	2.00
Steel bars, Philadelphia	2.27	2.27	2.27	2.17
Iron bars, Chicago	2.05	2.00	2.00	2.00
Shapes, Pittsburgh	1.95	1.90	1.90	1.85
Shapes, Philadelphia	2.01	2.01	2.06	2.08
Shapes, Chicago	2.05	2.05	2.00	2.00
Tank plates, Pittsburgh	1.95	1.90	1.90	1.85
Tank plates, Philadelphia	2.15	2.10	2.10	2.10
Tank plates, Chicago	2.05	2.05	2.00	2.00
Sheets, black, No. 24, Pittsburgh	2.85	2.85	2.85	2.75
Sheets, blue anl., No. 10, Pittsburgh	2.10	2.10	2.10	2.05
Sheets, gal., No. 24, Pittsburgh	3.60	3.60	3.60	3.65
Sheets, black, No. 24, Chicago	3.10	3.10	3.00	3.05
Sheets, blue anl., No. 10, Chicago	2.35	2.35	2.25	2.25
Sheets, galvanized, No. 24, Chicago	3.85	3.85	3.75	3.90
*Plain wire, Pittsburgh	2.50	2.50	2.50	2.50
*Wire nails, Pittsburgh	2.65	2.65	2.65	2.60
Tin plate, per base box, Pittsburgh	5.35	5.35	5.35	5.25
*To large jobbers.				
SCRAP				
Heavy melting steel, Pittsburgh	18.50	18.50	19.00	14.85
Heavy melting steel, eastern Pa.	17.00	16.25	16.50	13.75
Heavy melting steel, Chicago	15.75	15.55	16.50	12.75
No. 1 wrought, eastern Pa.	16.25	16.25	15.50	15.25
No. 1 wrought, Chicago	16.25	16.00	14.75	12.45
Rails for rolling, Chicago	17.50	17.50	17.10	14.00

Current Prices for Rolled Steel Products

PRICES IN CENTS PER POUND

STEEL PLATES

Pittsburgh, base	1.90c to 1.95c
Philadelphia, del.	2.10c to 2.25c
New York, del.	2.175c to 2.325c
Boston, del.	2.265c to 2.415c
Chicago, base	2.05c to 2.15c
Cleveland, delivered	2.14c
Lackawanna, N. Y., base	2.00c to 2.10c
Birmingham, base	2.10c to 2.20c
Coatesville, Pa., base	2.00c to 2.10c
Pacific Coast, c.i.f.	2.20c to 2.25c
St. Louis, del.	2.27c
Detroit, del.	2.19c to 2.24c

STRUCTURAL SHAPES

Pittsburgh, base	1.90c to 1.95c
Philadelphia, del.	2.01c to 2.11c
New York, del.	2.145c to 2.245c
Boston, del.	2.265c to 2.415c
Chicago, base	2.05c to 2.15c
Cleveland, delivered	2.14c
Lackawanna, N. Y.	2.00c to 2.10c
Birmingham, base	2.10c to 2.20c
Bethlehem, Pa., base	2.00c to 2.10c
Pacific Coast, c.i.f.	2.35c
Detroit, del.	2.19c to 2.24c

BARS

SOFT STEEL

Pittsburgh, base	1.95c
Chicago, base	2.05c to 2.15c
Birmingham, base	2.10c to 2.20c
Lackawanna, N. Y., base	2.00c to 2.10c
Pacific Coast, c.i.f.	2.35c
Cleveland, base, local mills	1.95c
Cleveland, del., outside mills	1.95c to 2.00c
Philadelphia, del.	2.27c to 2.37c
New York, delivered	2.29c to 2.39c
Boston, delivered	2.265c to 2.415c
Detroit, del.	2.19c to 2.24c
Pittsburgh, cold finishing	2.05c
Pittsburgh, forging quality	2.15c

RAIL STEEL

Chicago Heights	1.95c
Eastern mills	1.85c to 1.95c

IRON

Chicago, base	2.05c to 2.15c
New York, delivered	2.19c to 2.24c
Philadelphia, delivered	2.17c to 2.22c
Pittsburgh, refined	2.75c to 4.25c

REINFORCING

Pittsburgh, billet, cut lengths	2.25c to 2.30c
Stock lengths from mill	2.00c to 2.05c
Chicago, billet	2.35c to 2.40c
Chicago, rail steel	2.00c to 2.05c
Chicago, rail steel, road and bridge work	1.95c to 2.05c
Philadelphia, cut lengths	2.57c to 2.62c

SHEETS

SHEET MILL BLACK

No. 24, Pittsburgh, base	2.85c to 2.95c
No. 24, Philadelphia, delivered	3.27c
No. 24, Gary, Indiana Harbor	3.05c
No. 24, Chicago, delivered	3.10c
No. 24, Birmingham, base	3.10c
No. 24, St. Louis, del.	3.27c
No. 24, Pacif. coast ports, c.i.f.	3.50c

TIN MILL BLACK

No. 28, Pittsburgh, base	3.00c
No. 28, Gary, base	3.10c

GALVANIZED

No. 24, Pittsburgh, base	3.60c to 3.70c
No. 24, Philadelphia, delivered	4.02c
No. 24, Gary, Indiana Harbor	3.80c
No. 24, Chicago, delivered	3.85c
No. 24, Birmingham, base	3.85c
No. 24, St. Louis, del.	4.02c
No. 24, Pacif. coast ports, c.i.f.	4.25c

BLUE ANNEALED

No. 10, Pittsburgh, base	2.10c to 2.20c
No. 10, Philadelphia, delivered	2.42c to 2.52c
No. 10, Gary, Indiana Harbor	2.30c
No. 10, Chicago, delivered	2.35c
No. 10, Birmingham, base	2.35c
No. 10, St. Louis, del.	2.52c
No. 10, Pacif. coast ports, c.i.f.	2.725c

AUTOMOBILE

No. 20, Pittsburgh, base	4.10c
No. 20, Detroit, delivered	4.39c

FURNITURE

No. 24, Grade A, Pittsburgh	4.00c to 4.10c
No. 24, Grade B, Pittsburgh	3.80c to 3.90c

(Turn to the following page)

Buffalo furnaces are preparing to move 150,000 tons east by barge this season. Chicago district shipments in the first quarter were a record. Canadian producers are considering an advance of 50 cents to $1 per ton.

Semifinished steel continues scarce in all districts, restricting finishing mills at Chicago and Youngstown. Scrap is strong in most districts, the result of a heavy melt and only moderate stocks, though prices move narrowly. Though output of beehive coke has been restricted, production of merchant ovens declining for the first time since mid-January, prices of the furnace grade are softer. Beehive foundry coke prices are unchanged for April.

Car Orders Already Close to 1928 Total

The 4500 freight cars awarded late last week by the New York Central railroad brought March car orders up to 12,018 and the first quarter to 41,158, contrasted with 44,763 in all 1928. For their portion—about half—of the New York Central cars and the 500 placed by the Northern Pacific, Chicago district carbuilders have 75,000 tons of steel to specify. Locomotive business continues brisk, 11 being placed and 25 inquired for in the past week.

Though bars lead the heavy finished products, chiefly because of automotive demand, plates are a close second and structural shapes, for seasonal reasons, crowd for attention. Deliveries on bars and plates are 12 weeks defered at Chicago, where specifications have been averaging 50 per cent over 1928. An inquiry for 40,000 tons of steel by the Ford Motor Co. includes bars.

A Kansas City pipeline, requiring 35,000 tons of plates, has been placed with a Milwaukee interest. Barge work maturing at Pittsburgh will take 15,000 tons of plates, and oil storage tanks awarded at Chicago 12,000 tons. At New York 8200 tons of structurals for subways has been let.

Believe Speculative Buying Nil

In sheets as in strip, record production and record deliveries in March have made no appreciable dent in mill backlogs. Important makers of full finished sheets have their entire second quarter output reserved, and specifications now in hand against at least half of this tonnage. Chicago sheetmakers note a tendency to order farther ahead. Hot strip is moving a trifle faster than cold. Because its sheet specifications are usually for specific jobs, it is not believed that the automotive industry is pyramiding its needs.

Steel corporation subsidiaries continue to operate at their peak of 97 per cent. Independents are up one point, to 93½ per cent, and the entire industry averages 95½ per cent. Chicago ingot operations are at 98 per cent, or practical capacity. Pittsburgh mills average 95 per cent.

Iron and steel prices continuing stable at the recent advances, the IRON TRADE REVIEW composite of fourteen leading iron and steel products is unchanged at $36.57, the highest point for this index in twenty-one months.

Composite Market Average

Based on Pig Iron, Billets, Slabs, Sheet Bars, Wire Rods, Steel Bars, Plates, Structural Shapes, Black, Galvanized and Blue Annealed Sheets, Tin Plate, Wire Nails and Black Pipe

This Week (April 3, 1929)	$36.57
Last Week (March 27, 1929)	36.57
One month ago (March, 1929)	36.42
Three months ago (January, 1929)	36.24
One year ago (April, 1928)	35.67
Ten years ago (April, 1919)	48.45
Fifteen years ago (April, 1914)	23.39

Current Rolled Steel Prices

PRICES IN CENTS PER POUND UNLESS OTHERWISE INDICATED

Tubular Products Quoted On Last Editorial Page—See Preceding Page For Other Products

HOOPS, BANDS, STRIPS

Hot strip, to 6-in., Pitts.	2.00c
Hot strip 6 1/8 to 24-in., Pitts.	1.90c
Hot rolled strip, 12 to 24-inch 16 gage and heavier, coils or cut length, 1.90c plate basis, or 2.10c blue annealed basis.	
Hot strip, bands 6 in. and under, Chicago	2.10c to 2.30c
Do, 6 1/8 to 24 in.	2.00c to 2.10c
Cooperage stock	2.20c
Cold rolled strip, hard coils, 16 inches and under by 0.100-inch and heavier, base Pitts., Cleve. (3 ton and over)	2.75c to 2.85c
Worcester, Mass. (3 tons and over)	3.10c to 3.20c

ALLOY STEEL

Hot Rolled

F.o.b. Mills

Alloy Quality Bar Base is 2.65c

S.A.E. Series Number	Alloy differential	Net, 100 lb. bars
2000	0.25	$3.00
2100	0.55	3.30
2300	1.50	4.25
2500	2.25	5.00
3100	0.55	3.30
3200	1.35	4.10
3300	3.80	6.55
3400	3.20	5.95
4100 0.15-0.25 Mo.	0.50	3.25
4100 0.25-0.40 Mo.	0.70	3.45
4600 0.20-0.30 Mo. 1.25-1.75 Ni.	1.05	3.80
5100 0.60-0.90 Cr.	0.35	3.10
5100 0.80-1.10 Cr.	0.45	3.20
5100 Chrome Spring	0.20	2.95
6100 Bars	1.20	3.95
6100 Spring Steel	0.95	3.70
Chrome Nickel Vanadium	1.50	4.25
Carbon Vanadium	0.95	3.70
9250 (flats)	0.25	3.00
9250 (rounds squares)	0.50	3.25

COLD FINISHED STEEL

Cold finished steel bars drawn or rolled, Pitts., Chi., c.l.	2.30c
Do, del. Detroit	2.575c
Shafting (turned, polished) Pittsburgh	2.30c
Shafting (turned, ground) mill (Depending on size, 1 3/16 to 7-inch)	2.65c to 3.10c
Cold finished steel bars, Cleve.	2.25c to 2.35c

WIRE PRODUCTS

F.o.b. Pittsburgh, Cleveland, Ironton base

(Per pound)	Dealer trade	Large jobbers
Bright plain wire, 6 to 9 gage	2.60c	2.50c
Annealed field wire	2.75c	2.65c
Galvanized wire	3.20c	3.10c
Barbed wire, galvanized	3.40c	3.30c
(Per 100-pound keg)		
Wire nails	$2.75	$2.65
Galvanized nails	4.75	4.65
Polished staples	3.20	3.10
Galvanized staples	3.45	3.35
Cement coated nails	2.75	2.65
Manuf. wire, del. Detroit		2.735c
Wire nails, del. Detroit		$2.885

Joliet, DeKalb and Waukegan, Ill., Anderson, Ind., and Chicago prices $1 per ton over Pittsburgh-Cleveland-Ironton base on products made there; Duluth $2 higher; Worcester, Mass., Fairfield, Ala., $3 higher.

Woven wire fencing, retailers, Pittsburgh-Cleveland, net ton $65.

Anderson, Ind., $1 higher, Chicago $2 higher, Duluth, Birmingham $3 higher.

CUT NAILS, CHAIN PILING

Cut nails, c.l., f.o.b. mills	2.75c
Cut nails, l.c.l. f.o.b. mills	2.85c
Chain, 1-in., proof coil, Pitts.	6.00c
Sheet piling, base, Pittsburgh	2.25c

CAST IRON WATER PIPE

Prices per net ton

Class B pipe

Six-inch and over, Birming'm	$37.00 to 38.00
Four-inch, Birmingham	41.00 to 42.00
Four-inch, Chicago	49.20 to 50.20
Six-inch to 24-inch, Chicago	45.20 to 46.20
Four-inch, New York	42.80 to 44.80
Six-inch and over, New York	39.80 to 41.80
Standard fittings, Bir. base	$100.00

Six to 24-inch, base; over 24-inch, plus $20; 4-inch, plus $10; 3-inch, plus $20 gas pipe fittings, $5 higher.

Class A pipe is $4 higher than Class B.

TIN AND TERNE PLATE

Prices per 100-pound box Pittsburgh

*Tin plate, coke base	$5.35

Gary, Ind., base 10 cents higher.

Long ternes, primes, No. 24 4.00c to 4.10c

*Price subject to quantity differentials.

WASHERS

Wrought, c.l., Pitts. dist.	$6.50 to 6.75 off
Wrought, c.l., Chicago dist.	$6.70 to 6.90 off
Lock: to dealers	85-5 off
Lock: to consumers	85 off

RAILS, TRACK MATERIAL

Standard bessemer rails, mill	$43.00
Standard open-h'th rails, mill	$43.00
Relaying rails, St. Louis	$24.00 to 31.00
Relay rails, Pitts., 60 to 90 lb.	$22.00 to 27.00
Light rails, 25 to 45, mill	$36.00
Angle bars, Chicago base	2.75c
Spikes, railroad, Pittsburgh	2.80c
Spikes, small railroad, 7/16-inch and smaller, Pitts.	2.80c
Spikes, boat and barge, Pitts.	3.00c
Spikes, railroad, Chicago	2.80c
Track bolts, Pitts., steam roads	3.80c
Track bolts, Pitts., stand, jobbers	70 off list
Track bolts, Chicago	3.80c
Tie plates, Chicago, Pitts.	$43.00

BOLTS AND NUTS

Birmingham and Chicago

Discounts are for legitimate jobbing or large consuming trade purchasing in full-case lots, apply to lists of April 1, 1927.

Small lots are 55 to 60 per cent off.

CARRIAGE BOLTS

All sizes, cut thread	60 to 70 off
Rolled thread 3/8 x 6 and smaller take 10 per cent lower list.	
Eagle list	60 to 70 off

MACHINE BOLTS

All sizes, cut thread	60 to 70 off
Rolled thread 3/8 x 6 and smaller take 10 per cent lower list.	
Lag screws	60 to 70 off
Plow bolts, Nos. 1-2-3-7 heads	60 to 70 off
Tap bolts	60 to 70 off
Blank bolts	60 to 70 off
Stud bolts without nuts	60 to 70 off
Stove bolts, 75, 20, 10 and 5 off in pkgs., 75, 20, 10 and 5 with 2½ off in bulk.	
Tire bolts	60-5 off

Nuts

Semifinished	60 to 70 off

HEXAGON CAP SCREWS

Milled	80-10-5 off
Upset 1 in. diam. and smaller	85-off

SQUARE HEAD SET SCREWS

Milled	80-5 off
Upset 1 in. diam. and smaller	80-10-5 off

RIVETS

Struc., c.l., Pitts-Cleve.	3.10c
Structural, c.l. Chicago	3.00c to 3.20c
**7/16-inch and smaller, Pitts.	70 and 10 off
Chi., Cleve.	70 to 70 and off

**Some makers quoting 70 off with freight allowed on 300 pounds or more.

Raw Materials and Semifinished Products

SEMIFINISHED MATERIAL

Prices Per Gross Ton

BILLETS AND BLOOMS

4 x 4-inch base

Pittsburgh, open-hearth	$34.00
Pittsburgh, bessemer	34.00
Youngstown	34.00
Cleveland	34.00
Philadelphia	39.30
Chicago	35.00
Forging, Chicago	40.00
Forging, Pittsburgh	38.00 to 39.00
Forging, Philadelphia	44.30

SHEET BARS

Pittsburgh	$35.00
Youngstown	35.00
Cleveland	35.00
Chicago	35.00

SLABS

Pitts., Young., and Cleve.	$34.00

WIRE RODS

Pittsburgh, Cleveland	$42.00
Chicago	43.00

SKELP

All grades, Pittsburgh	1.90c to 1.95c

IRON ORE

LAKE SUPERIOR ORE

Per Gross Ton, Lower Lake Ports

Old range bessemer, 51½%	$4.80
Mesabi bessemer, 51½%	4.65
Old range nonbessemer, 51½%	4.50
Mesabi nonbessemer, 51½%	4.50

EASTERN LOCAL ORES

Cents per unit delivered at Eastern Pennsylvania and New Jersey furnaces

Foundry and basic, 56-63%	8.00
Copper free low phosphorus 58 to 65 per cent	nominal

FOREIGN ORE

Cents per unit, alongside docks Atlantic ports

Foreign manganiferous ore, 45-55% iron, 6-8% manganese	10.50 to 11.00
North African low phosphorus	11.50 to 11.75
Swedish foundry or basic, 65%	9.00 to 10.00
Spanish and North African basic, 50 to 60 per cent	10.00 to 11.00
Newfoundland foundry, 55%	8.50 to 9.00
Tungsten spot and early fut., short ton unit, duty paid	$13.00 to 14.00

MANGANESE ORE

Prices do not include duty of 1 cent per pound of metallic manganese contained.

Brazilian	34 to 36 cents
Indian	34 to 36 cents
Caucasian, (53-55 per cent)	36 to 38 cents

FLUORSPAR

85 and 5 per cent grade

Washed gravel, Kentucky and Illinois mines, per net ton	$18.00
Washed gravel, imported duty paid east. tide., gross ton	$20.40

REFRACTORIES

FIRE CLAY BRICK

Per 1000 f.o.b. works

First Quality

Pennsylvania	$43.00 to 46.00
Ohio	43.00 to 46.00
Illinois	43.00 to 46.00
Kentucky	43.00 to 46.00
Missouri	43.00 to 46.00
Maryland	43.00 to 46.00
Georgia and Alabama	40.00 to 45.00

Second Quality

Pennsylvania	35.00 to 38.00
Ohio	35.00 to 38.00
Illinois	35.00 to 38.00
Kentucky	35.00 to 38.00
Missouri	35.00 to 38.00
Maryland	35.00 to 38.00
Georgia and Alabama	30.00 to 35.00

SILICA BRICK

Pennsylvania	43.00
Joliet, Ill., East Chicago, Ind.	52.00
Birmingham	50.00 to 51.00

MAGNESITE BRICK

Pet Net Ton

9 x 4½ x 2½	65.00

MAGNESITE

Net Ton Chester, Pa., and Baltimore base

Dead-burned grain magnesite	40.00

CHROME BRICK

Net ton Chester, Pa., and Baltimore base

9 x 4½ x 2½	45.00

Pig Iron

Heavy Sales Follow Price Advances by Some Lake Furnaces—Purchases in Cleveland Largest in Many Weeks

PIG iron demand continues strong, and prices firm. March shipments by Chicago furnaces set a record for that month, and the total for the first quarter was the largest of any first quarter in their history. Following price advances a week ago by lake furnaces, except at Cleveland, sales by the furnace interests, with headquarters at Cleveland totaled 65,000 tons. This past week's total exceeded the preceding week by 50 per cent. Melters in and near Cleveland ordered about 20,000 tons for second and third quarter. A considerable volume of business was placed for shipment from other lake furnaces at the new prices. Sales in New England totaled 12,000 tons, and in New York 10,000 tons. About 150,000 tons have been booked at Buffalo for barge shipment East.

PITTSBURGH, April 2.—New pig iron business is quiet, the recent advance in prices, and the turn of the quarter bringing the usual period of inactivity. Furnaces are well booked and shipments still are heavy. Stocks gradually are declining and a shortage is appearing in several grades. Rush orders come occasionally from consumers who permitted supplies to become depleted. Others who have not placed their requirements for second quarter are determining their needs and are expected in the market soon. Furnaces are receiving a fairly steady run of small lot orders, interspersed with a few purchases as high as 500 tons. The new prices are well maintained.

Bessemer and basic averages, as compiled by W. P. Snyder & Co., last month were $18.39 and $17.60, respectively, showing a slight increase over the February figures of $18.25 and $17.50.

Boston, April 2.—Pig iron sales in this district in the past week totaled 12,000 to 13,000 tons. Of this the Mystic Iron Works booked 11,000 tons. The rest was divided between Buffalo furnaces. While practically all Buffalo district furnaces are on the $19, base, price, it is reported that $18 iron still is obtainable from the Buffalo district.

New York, April 2.—Sales of pig iron in this territory during the past week aggregated 10,000 tons. Fully 75 per cent of the consumers have contracted for second quarter. Prices are firmer, and $18, base, Buffalo, now is minimum on Buffalo iron for shipment here. With two sellers the minimum is $19, base, Buffalo. Malleable is 50 cents higher than foundry iron, at $18.50 to $19.50 base, Buffalo. With opening of 1929 navigation approaching, sales of pig iron are being made on the basis of water shipments from Buffalo. Barge canal rates from Buffalo now generally in effect are $2 to Beacon, N. Y., for trans-shipment to New England, $2.25 to Jersey City for transfer to railroad cars for further shipment by rail, and $2.50 to waterside consuming plants in New York harbor.

Buffalo, April 2.—Small sales of pig iron have been made to district melters at the new prices, $19.50 for No. 2 plain foundry and $20 for malleable. Orders in the past week were not sufficiently large to test the market, nor was there sufficient buying of Buffalo iron in the East to fix minimum prices available there. Shipments are heavy. Buffalo furnaces have contracts for the movement of more than 150,000 tons of iron by state barge canal following the opening of that waterway this month.

Cleveland, April 2.—Firmer pig iron prices, following the advances of 50 cents to $1 at Detroit, Buffalo and the valley, as noted a week ago, stimulated sales. The increase of 25 cents a ton in the price of iron ore also proved a strengthening factor. Melters who had not covered for second quarter took heed, with the result pig iron sales by furnace interests with headquarters in Cleveland mounted to 65,000 tons in the past week, against 41,000 tons the week preceding. Some iron is for third quarter. A special feature was heavy buying by melters in Cleveland and nearby cities. The total, divided between the two local interests, for delivery to plants in Cleveland and suburbs is close to 20,000 tons. It is known to be a fact the base price of $19, furnace, for local delivery applied on much, if not all, of this tonnage, and that $18.50, base, Cleveland furnace, was the price done on substantial sales made by Cleveland furnaces at distant competitive points. Sales in western Ohio, Indiana and lower Michigan also were heavy, and new prices of $20.50, base, lake furnace, for foundry, and $21 for malleable applied on a considerable portion of the business done during the week in those districts. Inquiry is brisk, and closed promptly. The rate of shipments in March was ahead of that for February, some makers report, while others say theirs was about equal for the two months. One was unable to ship all the iron it had calls for.

Cincinnati, April 2.—Despite a scarcity of inquiries for northern or southern pig iron this market continues strong. Inquiries on hand total about 3500 tons, namely for northern iron. Small orders for northern and southern iron were placed during the past week, but dealers report no large tonnages. Shipments on contracts are satisfactory.

St. Louis, April 2.—A further gain in melt is noted, and producers and distributors of pig iron are kept intensively busy meeting demands. Considerable tentative inquiry exists which indicates substantial unfilled requirements for second quarter. March was a heavy month in shipments, and would have been better but for scarcity of certain special grades. The month also was satisfactory in new business, with southern iron distribution stimulated by the cut in price. Basic sales were the heaviest for any month this year. In the past several days sales reported totaled approximately 5800 tons, of which the St. Louis Gas & Coke Corp. placed 5000

(*Concluded on Page* 956)

Pig Iron Prices

Per Gross Ton

Bessemer, valley furnace	$18.50
Bessemer, del. Pittsburgh	20.26
Basic, valley furnace	18.00
Basic, del. Pittsburgh	19.76
Basic, Buffalo furnace	17.50
Basic, del. eastern Pa.	20.25 to 20.50
Malleable, valley furnace	18.50
Malleable, del. Pittsburgh	20.26
Malleable, Cleve. fur. for local del.	19.00
Malleable, Chicago furnace	20.00
Malleable, Buffalo furnace	20.00
Malleable, del. eastern Pa.	22.26 to 22.91
Malleable, Granite City fur.	20.50
No. 1 foundry, Chicago furnace	20.50
No. 1X, eastern del., Phila.	22.76
No. 1X, Buffalo furnace	21.00
No. 2 foundry, valley furnace	18.00
No. 2 foundry, del. Pittsburgh	19.76
No. 2 plain, Buffalo furnace	19.50
No. 2 foundry, Chicago furnace	20.00
No. 2 fdy. Cleve. fur. for local del.	19.00
No. 2 plain, del., Phila.	21.76
No. 2 plain, Virginia furnace	20.75
No. 2 plain, Buffalo, del. Boston	22.91 to 23.91
No. 2 plain, N. J., tidewater	21.28 to 22.28
No. 2 Alabama, Bir. base	15.50
No. 2 Tenn., Birmingham base	15.50
No. 2 Tenn., del. Cincinnati	19.19
No. 2 Alabama, del. Cincinnati	19.19
No. 2 Alabama, del., Chicago	21.51
No. 2 Alabama, del., Cleveland	21.76
No. 2 Alabama, del. St. Louis	19.92
No. 2X, east, N. J., tidewater	21.78 to 22.78
No. 2X, eastern, del. Phila.	22.26
No. 2X, foundry, Buffalo furnace	20.00
No. 2X, Buffalo, del. Boston	23.41
No. 2X, Virginia furnace	20.25 to 20.75
Gray forge, val., del. Pittsburgh	19.26
Low phos., standard, valley	27.00
Low phos., standard, Phila.	24.26 to 24.76
Low phos., copper bearing fur.	23.00 to 23.50
Charcoal, Superior, del., Chicago	27.04

CANADIAN PRICES

No. 2 foundry, del. Toronto	23.60
No. 2 foundry, del. Montreal	25.00 to 25.50
Malleable, del. Toronto	23.60
Malleable, del. Montreal	25.00 to 25.50
Basic, del. Montreal	24.00 to 24.50

Silvery iron, Jackson county, O., furnaces, in per cents: 5—$23 to $24; 7—$25 to $26; 8—$26 to $27; 9—$27 to $28; 10—$29 to $30; 11—$31 to $32; 12—$33 to $34; 13—$35 to $36.

Bessemer ferrosilicon, Jackson county, O., furnaces, in per cents: 10—$31 to $32; 11—$33 to $34; 12—$35 to $36; 13—$37 to $38; 15—$41.50 to $42.50; 16—$43 to $44.

The Market Section

Coke

Spot Beehive Furnace Fuel Lower—Demand Is Less Active—Beehive Foundry Firm

BEEHIVE furnace coke for spot delivery is $2.80 to $2.90, compared with $2.85 to $3 a week ago. Contract shipments are less active, and smaller spot demand has tended to increase surplus. Merchant oven output is receding, for the first time since January. No change is noted in foundry grades. By-product coke prices have been renewed at March levels for April.

Pittsburgh, April 2.—Further softening is noted in the market for spot beehive furnace coke. Shipments on contracts are slightly less active, and with a lack of demand for fuel for prompt delivery surplus coke is more plentiful. The market is largely nominal, but the standard grade is no higher than $2.80 to $2.90, compared with the top price of $3 a week ago. Output is smaller. Merchant oven production is declining for the first time since the middle of January. Large operators continue well engaged on old orders and are not interested in spot business. Demand for heating coke is light, but foundry grades are active at unchanged prices.

Production of coke in the Connellsville region for the week ended March 23 was 78,640 tons, compared with 81,450 tons the preceding week, according to the *Connellsville Courier*.

Boston, April 2.—For the first time in about a year the price of domestic coke has been changed. Effective April 1 it is $12.50 for the greater Boston district, a reduction of 50 cents. Foundry coke, however, remains unchanged at $11. The demand for foundry grades continues good.

Cincinnati, April 2.—Continued activity is noticed in by-product and beehive foundry coke. Prices are unchanged for April.

Birmingham, Ala., April 2.—Coke demand is steady, shipments of the foundry grade being equal to the output. Prices are unchanged.

St. Louis, April 2.—The last half of March proved active in metallurgical coke. Shipments were the largest for any similar period this year, and a large volume of new orders was booked, mainly for prompt and April delivery. Prices on foundry coke remain unchanged, no revision as of April 1 having been announced by local by-product interests.

Coke Prices

Prices per Net Ton

Beehive Ovens	
Connellsville furnace	$2.80 to 2.90
Connellsville foundry	3.75 to 4.85
New River foundry	6.00 to 6.50
Wise county foundry	4.25 to 5.00
Wise county furnace	3.50 to 4.75
By-Product Foundry	
Newark, N. J., del.	9.00 to 9.40
Chicago ovens	8.00
New England del.	11.00
St. Louis del.	9.00
Birmingham, ovens	5.00
Indianapolis, del.	8.25
Ashland, Ky., ovens, Connell. basis	6.50
Portsmouth, O., ovens, Connell, basis	6.50
Detroit, ovens	9.00
Buffalo, ovens	8.75

Ferroalloys

Shipments Unusually High—Market Is Firm

Pittsburgh, April 2.—Occasional orders for spot ferromanganese and spiegeleisen at full prices of $109.79, delivered Pittsburgh, and $34, respectively, are coming to ferroallay sellers. Such business is not heavy, however, as all but the smaller consumers are covered by contract for current requirements. Special ferroalloys have been in fair demand. Some additional inquiry is received for fluorspar, although little business has been placed. Little change is expected in specifications for ferroalloys generally, in keeping with sustained steelmaking operations.

Fluorspar

Foreign Spar Sold for Water Delivery to Lake Region

FLUORSPAR PRICES, PAGE 940

New York, April 2.—A substantial part of the foreign fluorspar sold here recently is for shipment to the Great Lakes via the New York state barge canal, when navigation opens. On most of the foreign material sold recently the price was $12 per gross ton, plus a duty of $8.40. On some, slightly less was done.

Refractories

Heavy Demand Continues to Follow Large Steel Production

REFRACTORIES PRICES, PAGE 940

Pittsburgh, April 2.—March sales of refractory brick compared favorably with the two preceding months, and first quarter sales were at a record level. Repair work leads, although several new construction projects have taken considerable brick in this district. Work is nearing completion at the Neville Island plant of the Davison Coke & Iron Co. on relining stoves of the company's blast furnace, and lining for the by-product coke ovens and cement kilns will start soon. Open-hearth and heating furnace relining has been active, following heavy steelmaking operations for more than a year. Stocks of consumers continue low, and shipments are an important consideration in current business. Prices generally are steady, with first quality fire clay brick commanding $43 to $46, and second quality material $8 lower. Silica brick is steady at $43, with magnesite and chrome brick quoted $65 and $45, respectively.

Minimum Resale Prices Set by Byers

Minimum resale prices on wrought iron pipe have been established by the A. M. Byers Co., Pittsburgh, in its card dated April 1. On carloads the freight rate from Pittsburgh to destination must be deducted from basing discounts to determine the minimum resale price of shipments out of distributors stocks.

On carload mill shipments the price will be the discounts as shown on the card of bases No. 102, less 5 per cent, Pittsburgh basing, reduced by the carload freight to destination of such shipments. Exchange prices between distributors in the same territory will be five points higher than discounts as shown on this card. The Byers company announces it will refuse to make further sales to distributors who sell below the minimum resale prices.

Buffalo Ingot Output 90

Buffalo, April 2.—Ingot production continues heavy here, representing approximately 90 per cent of capacity of all steelworks. April schedules call for production on a similar scale.

Ferroalloy Prices

(In dollars, except ferrochrome)

Ferromanganese, 78 to 82 per cent, tidewater, duty paid	$105.00
Ferromanganese, del. Pittsburgh	109.79
Spiegeleisen, 19 to 21 per cent, domestic furnace, spot†	34.00
*Ferrosilicon, 50 per cent, freight allowed, carloads	83.50
*Do, less carload	88.50
Do., 75 per cent	130.00 to 150.00
Ferrochrome, 66-70 chromium, 4-6 carbon, cts. per lb. con., del.	11.00
Do., for spot delivery	11.50
Ferrotungsten, stand., lb. cont.	1.25
Ferrovanadium, 30-40 per cent, per lb., contained, on analysis	3.15 to 3.65
Ferro-carbon-titanium carload, producer's plant, net ton	160.00
Do., one ton to carload	170.00
Ferrophosphorus, per ton, carload 17 to 19 per cent, Rockdale, Tenn., basis (18 per cent)	91.00
Ferrophosphorus, electrolytic, per ton, carload, 23-25% f.o.b. Anniston, Ala. (24 per cent)	122.50

†Quantity diff. apply on 100 tons and over.
*These prices contract, spot $5 higher.

Scrap

Heavy Consumption and Light Supplies Hold Market Strength—Little Change in Prices

MELTERS of scrap are consuming such large tonnages in their heavy production schedules that a relative scarcity in many grades is apparent. Production also is heavy but carries no weight against the market. Prices are undergoing little change. Dealers and melters alike have small stocks.

Chicago, April 2.—While buying by consumers is lacking in iron and steel scrap, strength is being retained, and consumers are taking shipments at a liberal rate. Open weather has not brought out the abundance of scrap that had been expected, and consumption is at a rate seldom equaled. Several railroad scrap lists came out in the past few days, but the material offered is much less than normal. Suspensions of shipments are ordered only when sidetracks become crowded. Heavy melting steel is firm at $15.75 to $16.25. As high as $16.50 to $17, tracks, is being paid for melting steel by dealers. Unfilled orders are being reduced, and it is apparent larger consumers must come into the market shortly. Cast borings remain an exception to the otherwise firm market. Borings are lifeless at $10 to $10.50. Railroad malleable grades again are in spirited demand, with sales reported as high as $20, delivered in the Chicago switching district. High prices are being paid also for rail crops in 2-foot and 3-foot sizes.

Boston, April 2.—With a generally better, but not pronounced demand for

Iron and Steel Scrap Prices

Corrected to Tuesday noon. Gross tons delivered to consumers, except Detroit where dealers' buying prices are shown

Steel Works Scrap

HEAVY MELTING STEEL

Birmingham	12.00 to 12.50
Boston, dealers	12.75 to 13.00
Boston, No. 2	10.00 to 10.50
Buffalyo, No. 1	17.25 to 17.75
Buffalo, No. 2	14.75 to 15.00
Chicago	15.75 to 16.25
Cincinnati, deal.	13.50 to 14.00
Cleveland, No. 1	15.50 to 16.00
Cleveland, No. 2	15.00 to 15.50
Detroit, No. 1	14.25 to 14.50
Detroit, No. 2	12.25 to 12.75
East Pa., del. mill	17.00 to 18.00
Eastern Pa. No. 2	12.00 to 14.50
N. Y., deal., R. R.	13.50 to 14.00
N. Y., deal., yd.	8.50 to 9.50
Pittsburgh, No. 1	18.50 to 19.00
Pittsburgh, No. 2	16.50 to 17.00
St. Louis, No. 1	14.00 to 14.50
St. Louis, No. 2	13.00 to 13.50
Valleys, No. 1	18.00 to 18.50

COMPRESSED SHEETS

Buffalo	15.50 to 16.50
Chicago	14.00 to 14.50
Cleveland	15.00 to 15.50
Detroit	14.00 to 14.25
E. Pa. new mat.	14.50
Pittsburgh	18.25 to 18.75
Valleys	18.00 to 18.25

BUNDLED SHEETS

Buffalo	12.50 to 13.00
Cincinnati, deal.	11.00 to 11.50
Cleveland	13.00 to 13.50
Eastern Pa.	11.50 to 12.00
Pittsburgh	17.00 to 17.50
St. Louis	10.00 to 10.50

SHEET CLIPPINGS LOOSE

Chicago	8.50 to 9.00
Cincinnati	9.75 to 10.25
Detroit	9.25 to 9.75
St. Louis	10.00 to 10.50

STEEL RAILS, SHORT

Birmingham	13.00 to 14.00
Boston	11.25 to 12.25
Buffalo	19.00 to 20.00
Chicago (3 feet)	19.00 to 19.50
Chicago, 2 ft. and under	20.00 to 20.50
Cincinnati, deal.	19.00 to 19.50
Detroit	17.00 to 17.50
Pittsburgh	21.00 to 21.50
St. Louis	16.75 to 17.25

STOVE PLATE

Birmingham	13.00 to 13.50
Boston consumers	11.50 to 12.00
Buffalo	14.25 to 14.75
Chicago, net	12.75 to 13.25
Cinn., deal., net	10.00 to 10.50
Detroit, net	9.50 to 10.00
Eastern Pa.	13.00 to 13.50
N. Y. deal., mill	8.75 to 9.00
Pittsburgh	12.50 to 13.00
St. Louis	13.75 to 14.25

ANGLE BARS—STEEL

Chicago	17.25 to 17.75
St. Louis	14.75 to 15.25

COUPLERS, SPRINGS

Buffalo	18.50 to 19.50
Chicago	17.00 to 17.50
Eastern Pa.	19.00 to 19.50
Pittsburgh	22.00 to 22.50
St. Louis	15.75 to 16.00

LOW PHOSPHORUS

Buffalo, billets and bloom crops	19.00 to 20.00
Eastern Pa.	19.00 to 20.50
Pitts. billet and bloom crops	23.50 to 24.00
Cleve. billet and bloom crops	17.50 to 18.00

FROGS, SWITCHES, GUARDS

Chicago	16.75 to 17.25
St. Louis	15.25 to 15.75

SHOVELING STEEL

Chicago	15.75 to 16.25
Cleveland	11.75 to 12.00
Detroit	10.75 to 11.00
Pittsburgh	18.00 to 19.00
St. Louis	13.50 to 14.00

Iron Mill Scrap

RAILROAD WROUGHT

Birmingham	10.50 to 11.50
Boston, dealers	12.25 to 12.50
Yard wrought	9.50 to 10.00
Buffalo, No. 1	13.50 to 14.00
Buffalo, No. 2	16.00 to 17.00
Chicago, No. 1	16.25 to 16.80
Chicago, No. 2	15.75 to 16.25
Cinn., No. 2	13.50 to 14.00
Eastern Pa.	16.00 to 16.50
N. Y., No. 1 deal.	12.00 to 12.50
Pittsburgh, No. 1	14.50 to 15.00
Pittsburgh, No. 2	18.50 to 19.00
St. Louis, No. 1	13.25 to 13.75
St. Louis, No. 2	14.00 to 14.50

SPECIFICATION PIPE

Boston	11.00 to 11.25
Eastern Pa.	15.50 to 16.00
New York, deal.	11.25 to 11.75

BUSHELING

Buffalo, No. 1	16.50
Chicago, No. 1	14.00 to 14.50
Cinn., No. 1 deal.	11.00 to 11.50
Cinn. No. 2	8.00
Cleveland, No. 1	13.00 to 13.50
Cleveland, No. 2	11.25 to 11.75
Detroit, No. 1	12.00 to 12.50
St. Louis, No. 1	10.00 to 10.50

MACHINE SHOP TURNINGS

Birmingham	8.00 to 8.50
Boston	6.25 to 6.50
Buffalo	8.00 to 8.50
Chicago	9.00 to 9.50
Cincinnati, deal.	9.00 to 9.25
Cleveland	10.00 to 10.50
Detroit	7.25 to 7.50
Eastern Pa.	11.50
New York, deal.	8.00
Pittsburgh	11.00 to 11.50
St. Louis	8.00 to 8.50
Valleys	11.50 to 12.00

MIXED BORINGS, TURNINGS

For blast furnace use

Boston, dealers	6.50 to 7.00
Buffalo	11.75 to 12.00
Cincinnati, deal.	9.25 to 9.75
Cleveland	11.25 to 11.75
Detroit	9.00 to 9.25
Eastern Pa.	10.00 to 10.50
New York, deal.	6.50 to 7.00
Pittsburgh	12.50 to 13.00

CAST IRON BORINGS

Birmingham, chem.	13.00 to 13.50
Birmingham, plain	8.00 to 8.50
Boston, chem.	10.00 to 10.50
Boston, dealers	6.50 to 7.00
Buffalo	11.75 to 12.00
Chicago	10.00 to 10.50
Cincinnati, deal.	9.25 to 9.75
Cleveland	11.50 to 12.00
Detroit	9.00 to 9.25
Eastern Pa.	11.00 to 11.50
Eastern Pa., chem.	14.50 to 15.00
New York, deal.	7.25 to 7.75
Pittsburgh	12.50 to 13.00
St. Louis	9.50 to 10.00

PIPE AND FLUES

Cincinnati, deal.	9.00 to 9.50

RAILROAD GRATE BARS

Buffalo	13.50 to 14.00
Chicago, net	12.50 to 13.00
Cincinnati	10.00 to 10.50
Eastern Pa.	13.00
New York, deal.	9.25 to 9.75
St. Louis	13.00 to 13.50

FORGE FLASHINGS

Boston, dealers	10.50 to 11.00
Buffalo	13.75 to 14.25
Chicago	10.50 to 11.00
Cleve., over 10 in.	13.00 to 13.50
Detroit	12.00 to 12.50
Pittsburgh (light)	15.00 to 15.50

FORGE SCRAP

Boston, dealers	9.00 to 9.50
Chicago	18.50 to 19.00
Eastern Pa.	13.50 to 14.00

ARCH BARS AND TRANSOMS

Chicago, net	21.50 to 22.00
St. Louis	22.00 to 22.50

Iron, Steel Works Scrap

AXLE TURNINGS

Boston, deal	6.75 to 7.00
Buffalo	14.00 to 14.50
Chicago	13.00 to 13.50
Cleveland	12.50 to 13.00
Eastern Pa.	15.00 to 16.00
Pittsburgh	16.50 to 17.00
St. Louis	12.00 to 12.50

STEEL CAR AXLES

Birmingham	18.00 to 19.00
Boston, ship point	17.00 to 17.50
Buffalo	19.00 to 20.00
Chicago	19.60 to 20.15
Eastern Pa.	22.75 to 23.00
Pittsburgh	21.00 to 22.00
St. Louis	20.50 to 21.00

SHAFTING

Boston, ship point	14.50 to 14.75
Chicago	17.35 to 17.90
Eastern Pa.	19.00 to 20.00
New York, deal.	15.00 to 15.50
St. Louis	18.50 to 19.00

Iron Foundry Scrap

CAR WHEELS

Birmingham, iron	12.00 to 13.00
Boston, iron	14.00 to 14.50
Buffalo, iron	14.00 to 14.50
Buffalo, steel	18.50 to 19.50
Chicago, iron	14.50 to 15.00
Chi., rolled steel	19.00 to 19.50
Cincinnati	12.50 to 13.00
Eastern Pa. cast	16.50 to 17.00
Eastern Pa., rolled	19.00
N. Y., iron, deal.	12.50 to 13.00
Pittsburgh, iron	16.25 to 16.75
Pittsburgh, steel	22.00 to 22.50
St. Louis, iron	15.00 to 15.50
St. Louis, steel	17.00 to 17.50

No. 1 CAST SCRAP

Birmingham, cup.	14.00 to 14.50
Buffalo	16.00 to 16.50
Boston, textile	16.00 to 16.50
Chicago, mach.	17.90 to 18.50
Chicago, railroad	16.80 to 17.35
Chicago, agri.	16.25 to 16.80
Cincinnati, mach. cupolas, gross	19.50 to 20.00
Cleveland, cupola	16.50 to 17.00
Detroit, net	13.00 to 13.50
East. Pa., cupola	16.00 to 17.00
N. Y., cup., deal.	13.00 to 13.50
N. Y., del. local foundries	17.00 to 17.50
Pittsburgh, cupola	15.50 to 16.00
San. Fran., del.	13.50 to 14.00
Seattle	15.50 to 16.00
St. L. No. 1 mach.	15.50 to 16.00
St. Louis, No. 1	15.00 to 15.50
Valleys	16.50 to 17.00

HEAVY CAST

Boston	10.50 to 11.00
Buffalo, breakable	13.00 to 13.50
Cleve., breakable	12.50 to 12.75
Detroit, auto., net	18.00 to 18.50
Detroit, breakable	9.50 to 10.00
Eastern Pa.	16.00
New York, deal	11.75 to 12.50
Pittsburgh	13.50 to 14.00

MALLEABLE

Boston, railroad	16.50 to 17.00
Buffalo	18.00 to 18.50
Chicago, agri.	15.50 to 16.00
Chicago, railroad	19.00 to 19.50
Cinn., R. R., deal.	15.50 to 16.00
Cinn., agri., deal.	14.25 to 14.75
Cleveland, rail	16.00 to 16.50
Detroit, auto	14.00 to 14.50
St. Louis, rail	16.50 to 17.00

Miscellaneous Scrap

RAILS FOR ROLLING

5 feet and over

Birmingham	14.00 to 15.00
Boston, dealers	12.00 to 12.75
Rails scrap, Boston	11.00 to 12.25
Skeleton, Boston	9.50 to 10.00
Buffalo	16.00 to 16.50
Chicago	17.50 to 18.00
Eastern Pa.	18.00 to 18.50
New York	14.00 to 14.50
Pittsburgh district	18.00 to 18.50
St. Louis	16.00 to 16.50

LOCOMOTIVE TIRES

Chicago, cut	19.00 to 19.50
St. Louis, No. 1	15.50 to 16.00

LOW PHOS. PUNCHINGS

Chicago	18.00 to 18.50
Pittsburgh	21.50 to 22.00

a number of scrap grades the price range was firmer during the past week. A boat is loading for Danzig, which will take 4000 tons and some fresh buying has started for another consignment for the same port, for a sailing in about a month. While slightly better activity has developed, a considerable part of buying was confined to certain lines and these prices showed firmer than others.

New York, April 2.—Scarcity of No. 1 railroad steel has caused scrap dealers here to advance this material 50 cents a ton to $13.50 to $14, New York. Buying prices on all other grades are unchanged, but with the general tone of the market strong.

Buffalo, April 2.—There has been no new tonnage buying of heavy melting steel, but dealers say values are holding well in spite of lack of new business. Blast furnace material is a little easier and some other grades are off slightly from recent peak prices.

Pittsburgh, April 2. — Continued heavy consumption of iron and steel scrap is reflected in a firm market. Dealers find no surplus in their attempts to cover on orders and although active mill buying still is lacking on some grades, dealers are making no concessions from recent quotations. Dealers have been able in some instances to pick up heavy melting steel at $18 but are not interested in orders at less than $18.50 to $19, the latter representing the market on railroad material at which some business was placed a short time ago. Low phosphorus grades and steel specialties continue strong and in good demand. Blast furnace material is stronger following a slight advance recently. Cast grades are steady at slightly higher figures.

Cincinnati, April 2.—Iron and steel scrap strength in other markets is being felt in this district. For the first week during the last two months no change in prices has been made and the market has taken on a firmer appearance. Buying continues slow, but dealers report scrap hard to obtain.

St. Louis, April 2.—While not experiencing a boom, iron and steel scrap continues active and strong. Demand is broad and diversified, reflecting the steady increasing melt. Stocks vary as to size, but are growing smaller. More favorable weather has been marked by increased manufacturing and preparation operations at yards. Relatively little material is being laid down and dealers are not disposed to invest at present levels.

Birmingham, Ala., April 2.—Demand for several items of iron and steel scrap is good and much old material is moving. No change in price is noted, heavy melting steel being firm above $12.50 on the best quality, while $10.50 is paid for general scrap of this grade.

Toronto, Ont., April 2.—Steady improvement in demand is reported for iron and steel scrap materials in Toronto and Montreal markets. Inquiry for spot and future delivery is good, and dealers are carrying considerable future delivery business on their books. Prices are firm but without change.

Philadelphia, April 2.—Strength is developing in the market for iron and steel scrap. One eastern mill has bought several thousand tons of heavy melting steel at $17, delivered. This is the highest paid by consumers, but dealers have given $17.50, delivered, for some of this grade. Some consumers have options with dealers at $18.

The Pennsylvania railroad closes bids at Philadelphia April 10 on 45,965 tons of scrap, including 8850 tons of heavy melting steel, 6300 tons of uncut structural scrap and 4080 tons of steel rails.

Cleveland, April 2.—Some local mills apparently are buying much scrap direct. Consuming rates are increasingly high and some of their scrap piles are growing, despite the fact that dealers recently have not sold much to them. It is true that shipments against old orders have been heavy but dealers find themselves outbid on automotive and railroad lists. A Sharon, Pa., interest is understood to be buying regularly. Recent activity in Pittsburgh and vicinity holds up the Youngstown market. Cleveland dealers are offering as much as $16 for heavy melting steel for local delivery. Prices are unchanged from a week ago.

Semifinished Steel

Stocks Small—Users Shopping for Material—Prices Firm

SEMIFINISHED STEEL PRICES, PAGE 940

Pittsburgh, April 2. — Sustained steelmaking operations have failed to relieve the scarcity of semifinished steel. Consumers specified fully against first quarter contracts, but heavy production of finished products has been moving billets and sheet bars rapidly into consumption, and most consumers have only small stocks. Some mills have been endeavoring to purchase additional supplies of semifinished material but have found little available. Although there have been intimations that premiums could be commanded on substantial tonnages of billets and sheet bars, such prices as yet have not come to light. Current quotations of $34 for 4 x 4-inch rerolling billets and slabs, and $35 for sheet bars are firm. Wire rods are active and steady at $42.

Cleveland, April 2.—Backlogs for semifinished steel with the leading producer here are the largest since the war, extending for more than 30 days. March shipments while heavy were not as large as the total for January, due mainly to inability to get out the steel. This maker has been operating at full capacity for 14 months. Current demand is well maintained, and prices are firm.

Chicago, April 2.—The constant heavy demand for semifinished material precludes offerings in the open market, but it is understood premiums have been offered and as high as $37, Chicago, would be asked for sheet bars if tonnages were available. Commercial or rerolling billets, 4 x 4-inch base, are nominal at $35, Chicago.

Youngstown, O., April 2.—Shortages of billets, sheet bars and slabs continue throughout the district, although independent open hearths in several important instances have run full tilt on every Sunday throughout March. If more steel were available, more valley sheet and bar mills could be busy. Rationing of semifinished steel is practiced among the intergrated mills with relation to their finishing mills. Sheet bars are firm at $35, Pittsburgh and Youngstown, billets and slabs at $34, same bases, and wire rods, $42, Pittsburgh and Cleveland.

Philadelphia, April 2.—Several sales of billets in the past week show the market is firm at $34, base, Pittsburgh, for rerollers and $39 for forging quality. A large plate mill has purchased 10,000 tons of ingots to augment its supply of semifinished.

Canadian Scrap

Dealers' Buying Prices

MONTREAL

Per Gross Tons

Iron axles	$22.00
Steel axles	20.00
Car wheels	16.00
Stove plate	13.00
Wrought pipe	6.00
Turnings	6.50
Heavy melting steel	8.00

TORONTO

Steel axles	14.00
Iron axles	16.00
Heavy melting steel	9.50
Turnings	7.00
No. 1 mach. cast (net)	15.00
Malleable (net)	13.00

Pittsburgh Rate Steady

Pittsburgh, April 2.—Steel ingot production is steady in this district at 95 per cent of capacity. Open-hearth furnaces are being operated at capacity but a scarcity is appearing in semifinished steel of this grade. Production of bessemer steel is on a lower basis. In finishing departments, bars, strips and sheets continue the leading items, with mills of the two latter running at capacity. Tin plate production is slightly higher at about 93 per cent. Seamless tube mills are unchanged at 75 to 80 per cent and pipe mills at 50 to 60 per cent.

Chicago Operations 98

Chicago, April 2.—Steelworks operations in the Chicago district are virtually at capacity at a rate of 98 per cent. Of the 36 steelworks furnaces in the district 29 are blowing. Illinois Steel Co. has 10 furnaces melting at Gary, nine at South Chicago, and one at Joliet. Inland Steel Co. has four and Youngstown Sheet & Tube Co. two furnaces active at Indiana Harbor, and Wisconsin Steel Co. has its three stacks blowing at South Chicago. Sheet mill operations are held down by heavy semifinished requirements in other departments. Structural mills in the Chicago district are better occupied than for many months.

The Market Section

Bars

Steady Demand Holds Mill Backlogs—New Records of Production Being Attained

MILL congestion continues to hold deliveries to several weeks and steady specifications against second quarter contracts afford no opportunity to catch up with obligations. The advance of $1 above first quarter prices has not been sufficient to change the attitude of buyers. Prices are steady and usually are secondary to delivery of material.

BAR PRICES, PAGE 939

Chicago, April 2.—Shipments and specifications in bar mill and other finished products show no lessening. Final reports disclose that March shipments set a new record and preliminary figures indicate that first quarter production has surpassed all previous output totals for that period. Specifications now are over 50 per cent above the weekly averages of the past year. The bar delivery situation remains tight, with mills obligated 12 weeks and farther on current tonnage at capacity operations. April schedules, according to producers, promise to be as pressing as in March. All bar consumers have heavy programs.

Alloy steel bar mills, operating at capacity, report lengthening deliveries and heavy April schedules from automotive sources. Prices are unchanged. Soft steel bars are 2.05c to 2.15c, Chicago, to miscellaneous buyers. Bar iron now is on the same basis as soft steel bars. Bar iron mills have the heaviest backlogs in several years. Rail steel bar mills report gains in fence post sales and a steady industrial demand. Rail steel bars are 1.95c, Chicago Heights, to the manufacturing trade.

New York, April 2.—Current indications are it will require four to six weeks for mills to clean up shipments of steel bar specifications against first quarter contracts. In the meantime, specifications for shipment against second quarter contracts already involve a considerable tonnage, so that position of bar mills is unusually comfortable. The old price level has disappeared so far as new business is concerned and the current range of prices is 1.95c to 2.05c, base, Pittsburgh, equivalent to 2.29c to 2.39c, delivered New York.

Pittsburgh, April 2.—Mill backlogs of merchant steel bars will sustain operations through April. Deliveries continue deferred, with three to four weeks representing average sizes and some smaller sections running six weeks and more. Despite heavy tonnages placed a short time ago, mills see little buying in anticipation of future requirements except as a precautionary measure to insure delivery. The advance for second quarter of only $1 a ton over the first quarter was not regarded as sufficient stimulus to sharply increase demand. The market generally is 1.95c, since higher prices are quoted only on less desirable business.

Detroit, April 2.—Second quarter contracts for soft steel bars are being written at 1.95c, Pittsburgh. Except for a 1.95c, Cleveland, price made by Cleveland mills, the advanced price has applied on those contracts which have been written. Some users have not covered, for one reason on account of deferred deliveries. Demand for soft steel bars never has been greater, and some makers have little capacity left for May. Ford is inquiring for a round tonnage. Alloy steel bar demand is commensurate with soft steel, with 2.65c, mill, quoted to users, with usual differentials for tonnages.

Cleveland, April 2.—Soft steel bar demand, on the whole, is well sustained. One outside mill notes a slight shrinkage, but for others the volume holds. An automobile interest which let down several weeks ago is again pressing for material. March probably set a bar record for this district. Acceptance of specifications to March 31 caused a bulge last week. Local mills quote 1.95c, Cleveland, and outside mills 1.95c to 2.00c, delivered.

Philadelphia, April 2.—Steel bar consumption continues heavy and consumers are taking good shipments on specifications against first quarter contracts. Some mills allowed certain customers to the end of March to specify. Steel bar requirements during April and partly during May will be supplied largely by first quarter shipments but some buyers already are specifying against second quarter arrangements. The bar price range is firm at 1.95c to 2.05c, Pittsburgh, on new business.

Plates

Market Active, Prices Steady—Pipe Line, Oil Storage and Barge Work Feature Week's Business

ACTIVITY in the plate market continues most pronounced in the Middle West, with Chicago mills operating at capacity, and deliveries deferred more than 12 weeks. Eastern mills are operating at 70 to 80 per cent. A Milwaukee maker was awarded 35,000 tons of welded pipe for a Kansas City gas line. Additional oil storage tank work at Chicago took 12,000 tons.

PLATE PRICES, PAGE 939

Pittsburgh, April 2.—New plate specifications are slow to develop, but mills have a fair tonnage to ship against first quarter contracts. Plates still lack the activity of bars, but a fair demand is coming from barge builders and miscellaneous users. Total barge business during March took more than 7800 tons of plates and shapes, and a large volume of work still is pending. Interest centers on a list of 50 barges for the Inland Waterways Corp., bids to close April 8. This work will require approximately 15,000 tons of plates. A number of contracts have been placed at 1.95c, although this price as yet is not thoroughly established.

New York, April 2.—Plate demand in this territory continues brisk and eastern mills generally are able to maintain their operations at substantially 70 to 80 per cent. Aside from extensions of first quarter prices in some instances, old prices are out of the way as far as new business is concerned. The current levels now are 1.95c to 2.05c, base, Pittsburgh, or 2.05c to 2.15c, base, Coatesville, depending on which of these producing centers takes the lowest freight rate to point of consumption. American Locomotive Co. will fabricate about 2700 tons of pipe for a line in the Borough of Queens, to be built by J. F. Murphy. About 3500 tons of plates is involved in a second pipe line in Queens, expected to come up in the next two weeks for bids.

Chicago, April 2.—A Milwaukee maker has been awarded 35,000 tons of welded pipe for a Kansas City gas line. This pipemaker has been taking 1200 to 1500 tons of plates daily during first quarter for its welded pipe projects now being fabricated. Empire Oil & Refining Co. has awarded 4000 additional tons of plates as a part of the first unit of its refinery works at East Chicago, Ind. Other storage tank work in the past week amounted to about 8000 tons for two small projects in the South. Plate deliveries remain tight. Shipments are extended even further than 12 weeks for some sizes. All plate mills in the district continue operations at capacity. The plate market is 2.05c to 2.15c, Chicago, with tonnage differentials to preferred buyers.

Cleveland, April 2.—Miscellaneous orders for plates have increased un-

filled order books. Many such orders were accepted on first quarter contracts and the time for specifications extended to March 31. Buyers are well covered for second quarter at 1.95c, base, Pittsburgh, and resistance against the $1 increase is wearing away. Deliveries are two to four weeks deferred. Locomotive shops are busier and are ordering more plates. Structural and boiler shops are active. The Biggs Boiler Works Co., Akron, O., is understood to have been awarded 5000 tons for a pipe line for Detroit.

Philadelphia, April 2.—Plate prices are firm. The current range on new business is 1.95c to 2.05c, base, Pittsburgh, and 2.05c to 2.15c, base, Coatesville. Indications are that the Newport News Shipbuilding & Dry Dock Co. will each book two Dollar Line boats shortly, while an additional two are later expected to go to the Newport News company. It is expected the Bethlehem Shipbuilding Corp. will book two Matson Line boats. The navy department will open bids May 25 on two cruisers to be built in private yards. The Export Steamship Corp.'s four new boats will be awarded soon. The foregoing boats will require about 150,000 tons of steel.

CONTRACTS PLACED

5000 tons, 60-inch welded steel pipe line for Detroit, to Biggs Boiler Works Co.
4000 tons, additional tonnage for Empire Oil & Refinery Co., refinery works at East Chicago, Ind., to unstated fabricator.
1500 tons, plates and shapes, four combination tank and cargo barges for American Barge line, to Howard Shipyards & Dock Co.

CONTRACTS PENDING

240 tons, 4 to 16-inch welded, riveted or cast iron pipe, Sierra Madre, Calif. Bids April 9.
150 tons, fire box plates for four locomotives for Nickel Plate railroad. Protections asked.

Tutein Version Is Heard

New York, April 2.—Examination of Frank W. Jones, Eastern Steel Co., Philadelphia, and cross examination of E. Arthur Tutein, head of E. Arthur Tutein Inc., and an accountant connected with the Boston firm of Elliott Davis & Co., concluded the complainant's presentation in the complaint of E. Arthur Tutein Inc. against the Hudson Valley Coke & Products Corp., alleging breach of coke and pig iron sales contracts. The defendant company's first witness is Warren S. Blauvelt, vice president, Hudson Valley Coke & Products Corp. The hearings are being conducted at 42 West Forty-fourth street, New York, before Louis K. Comstock, Judge Sherman L. Whipple and Senator Robert F. Wagner, arbitrators.

Ludlum Steel Corp. has leased a one and two-story building at Fulton and Elizabeth streets, Chicago, for a term of ten years.

Pipe

Small Orders Predominate—Large Ones in Immediate Prospect—All Prices Firm

WHILE action still is deferred on large lots of pipe, such as 12,005 tons for New York, 30,000 tons for Albany, etc., numerous small orders were placed. French sellers are low on 5000 tons for Detroit but domestic producers are low on the 4500-tons remainder. A public utility bought 2800 tons. Buttweld deliveries are lengthening.

PIPE PRICES, PAGE 940

Chicago, April 2.—Bids on the 9500 tons of 16, 24 and 36-inch cast iron pressure pipe for Detroit range from $39.30 to $41.25, delivered. French sellers submitted the low bid on 1500 tons of the 24-inch and 3500 tons of the 36-inch. Two domestic sellers are low on about 4500 tons of centrifugal pipe in that inquiry. United States Cast Iron Pipe & Foundry Co. is low on 2700 tons of 16 and 36-inch cast pipe for Akron, O. Chicago waterworks department is asking bids on 985 tons of 12-inch pipe. Flint, Mich, took bids yesterday on 800 tons of 6 and 8-inch pipe, and Whitefish Bay, Wis., on 350 tons of 6 to 12-inch. A utility company has ordered 2800 tons of special joint gas pipe. After recent activity a slight lull in fresh business has developed. The Chicago delivered quotation is steady at $45.20 to $46.20 for carload business.

Boston, April 2.—Approximately 1000 tons of pipe was placed in the past week. Milford, Mass., awarded about 100 tons, Peabody, Mass., awarded 3100 feet, Beverly, Mass., ordered 200 tons while 500 tons were awarded by Haverhill, Mass. Methuen, Mass., opened bids on 100 tons of 6-inch pipe April 2. Prices hold strong.

New York, April 2.—Award has not yet been made by the local department of water supply, gas and electricity on its 12,005 tons of cast pipe. It is believed that the business will go to the low bidders, noted in last week's issue. Aside from this tonnage and the 30,000 tons of 48-inch cast pipe previously noted as pending for Albany, N. Y., little in the way of municipal tonnages is pending. Prices meanwhile, are only fairly steady.

Pittsburgh, April 2.—Demand for tubular products, except boiler tubes and mechanical tubing, expands slowly. Welded grades are dull but buttweld pipe is showing to better advantage than lapweld. Seamless tubing orders for the oil country are fairly steady although no more active than a month ago. Prospects for this material have been dimmed slightly by developments in restriction of oil drilling. The line pipe market continues quiet and there are no further developments on lines now under inquiry. Mill operations are unchanged.

Cleveland, April 2.—Buttweld pipe order books are growing. This is shown by the fact jobber buyers no longer are able to obtain car numbers the day or the day after the order reaches the mill. Some shipments are deferred a week or longer, despite the healthy condition of mill stocks. Contributing to this condition this particular week is the fact that ocean bottom freight rates advanced 5 cents April 1. This caused mills to make numerous heavy rail-water shiments to the western seaboard. Jobber demand is growing as spring advances. Prices are firm.

Birmingham, Ala., April 2.—Production of cast iron pipe is steady, though not up to capacity. Shipments have shown improvement recently and a few new lettings have come in. The market is not considered as good as might be expected at the beginning of spring and some talk is heard about overproduction. Centrifugal pipe is having the call and a large tonnage is to be delivered during the next 60 days from this center.

CONTRACTS PLACED

3100 feet, 6 and 8-inch pipe, for Peabody, Mass., to United States Cast Iron Pipe & Foundry Co.
2217 tons, 16 to 30-inch class B, Los Angeles, allocated as follows: 1480 tons 30-inch to United States Cast Iron Pipe & Foundry Co.; 532 tons, 24-inch to American Cast Iron Pipe Co.; and 205 tons of 16-inch to C. G. Claussen & Co.
2,173 tons, Tacoma, Wash., improvement project, to French interests through Paine & Galucci, general contractors.
515 tons, 16-inch class 100, Eugene, Oreg., allocated as follows: 351 tons to National Cast Iron Pipe Co., and 164 tons to United States Cast Iron Pipe & Foundry Co.
500 tons, 4 to 12-inch pipe, Haverhill, Mass., to Warren Foundry & Pipe Co.
325 tons, Wenatchee, Wash., improvement project, to United States Cast Iron Pipe & Foundry Co.
200 tons, 6-inch pipe for Newton, Mass., to United States Cast Iron Pipe & Foundry Co.
200 tons, 6 and 8-inch pipe, Beverly, Mass., to Warren Foundry & Pipe Co.
120 tons, 6-inch pipe and fittings, Astoria, Oreg., to McWane Cast Iron Pipe Co.
113 tons, 4 to 42-inch class 150 Monterey Park, Calif., to United States Cast Iron Pipe & Foundry Co.
100 tons of 4, 12 and 16-inch class C pipe for Neenah, Wis., to James B. Clow & Sons.
100 tons, 8-inch pipe, Milford, Mass., to Donaldson Pipe Co.

CONTRACTS PENDING

30,000 tons, 48-inch cast pipe for Albany, N. Y. United States Cast Iron Pipe &

Foundry Co., only bidder on entire tonnage. R. D. Wood & Co., and Warren Foundry & Pipe Co. bid on specific sections.

14,000 tons for Detroit: 9500 tons of 16, 24 and 36-inch cast and 4500 tons of centrifugal pipe. French sellers low on 1500 tons of 24-inch and 3500 tons, of 36-inch cast pipe, at $39.30, delivered; American Cast Iron Pipe Co. low on 1000 tons of 24-inch at $41; James B. Clow & Sons low on 1500 tons of 24-inch at $40.65; Lynchburg Foundry Co. low on 2000 tons of 36-inch at $40.92; United States Cast Iron Pipe & Foundry Co., bid $41.25 on all sand cast. R. D. Wood Co. low on centrifugal.

4000 tons, 16 and 36-inch pipe, Akron, O. United States Cast Iron Pipe & Foundry Co., low on 2700 tons of sand cast. United States company and American Cast Iron Pipe Co. low on 1300 tons centrifugal cast, same inquiry.

2800 tons, special joint gas pipe for unstated Chicago utility company.

985 tons, 12-inch pipe, Chicago.

800 tons, 6 and 8-inch pipe, Flint, Mich.; bids April 1.

600 lineal feet of 4-inch and 11,256 lineal feet of 6-inch pipe special castings for Oshkosh, Wis. Bids close April 8.

600 tons, miscellaneous castings, including 150 tons 6 to 24-inch for New York water department. Direct bids to be taken April 10.

500 tons, 6 to 20-inch cast pipe for New York department of water supply. Contractors' bids open April 5.

350 tons, 6, 8 and 12-inch pipe, Whitefish Bay, Wis.; bids April 1.

100 tons, 6-inch pipe, Methuen, Mass. Bids opened April 1.

Tin Plate

Operations Increased to 93 Per Cent —Canners Ordering Liberally

TIN PLATE PRICES, PAGE 940

Pittsburgh, April 2.—Increased specifications for tin plate have been followed by a further advance in operations of mills in this district. The average now is about 93 per cent, compared with 90 per cent a week ago. Operations of some mills are at capacity. Favorable reports are heard of some of the earlier packs of vegetables, and canners are ordering material freely. Tin plate continues $5.35 per 100-pound base box, Pittsburgh.

Youngstown, O., April 2.—An extraordinarily heavy run of tin plate specifications now is in hand by Steel corporation subsidiaries and independent mills in this district. Output is restricted by lack of sheet and tin bars. Demand for tin plate continues to grow, and signs multiply of an exceedingly good season for plate.

Valley Rate Unchanged

Youngstown, O., April 2.—Independents have 48 open hearths active this week out of 51 units, unchanged from last week. Steel corporation subsidiaries are at capacity in the open-hearth department but slightly lower in bessemer, probably averaging 80 to 85 per cent. Independent steel bar mills continue at 75 per cent, limited by billet supplies, while Carnegie bar mills are at 85. Four additional independent sheet mills are rolling this week, making 117 units active out of 125. Wrought pipe mill operations are unchanged with 11 engaged of a total of 20 welded and seamless units. Tin plate operations of both Steel corporation subsidiaries and independents are around 85 per cent. Strip mill activities continue at capacity.

Sheets

Demand Well Sustained—March Busiest Month in History for Some Producers

NO SLACKENING in demand for sheets is noted in any of the leading consuming districts. Demands from the automotive industry continue at the recent high level, or better. Shipments from mills in the Pittsburgh district set a new record for first quarter. March was the most active month in history for same producers. Tonnage is being placed at the new prices.

SHEET PRICES, PAGE 939

Pittsburgh, April 2.—Specifications for sheets show no let down, following probably the most active month in history for most producers. Heavy tonnage placed last month brought to a close a quarter that broke previous shipping records for leading mills in this district. Recent business has exceeded production, despite near-capacity operations, and backlogs hold to their previous high levels. Deliveries of full finished material still extend six weeks, and on commoner grades three to five weeks. Specifications from automotive interests show no slackening and any change is for the better. On the basis of current backlogs, material placed now will not go into consumption until the middle or latter part of May. Buying from other consuming lines also is well maintained. Material for railroad cars, stoves and ranges, electrical refrigerators and other electrical equipment is specified in steady volume. Prices show a firmer tone and recent days have witnessed the placing of an increased amount of business at new levels of 2.95c, Pittsburgh, for sheet mill black, 3.70c for galvanized and 2.20c for blue annealed. Tin mill black continues at 3.00c and autobody at 4.10c, unchanged. Operations are being pushed, and the average is close to 100 per cent.

Buffalo, April 2.—Demand for black and automobile body sheets continues good. Prices are 3.215c, Buffalo, for black, and 4.365c for galvanized. Buffalo sheet mills are operating at about 90 per cent. Forward bookings are reported large.

Youngstown, O., April 2.—No sign appears of any letup in demand for various grades of sheets in this district, and makers do not expect much if any easing down in the second quarter. One important maker in March broke all its records in production, sales and shipments; and expects to do equally as well in April. A huge volume of specifications for shipment at mill's convenience continue to flow in from all consumers. Blue annealed has leaped into front rank demand. Blue annealed is firm. at 2.20c, Pittsburgh, galvanized at 3.70c, autobody at 4.10c and common black at 2.95c.

Cleveland, April 2.—Sheet orders are holding to high levels. Some deliveries are deferred until late in June. Semi-finished steel shortage is becoming more acute. Automotive demands are undiminished. Railroad equipment demand is mounting. Electrical sheet orders are numerous, as are those from electrical refrigerator, stove, range, furnace and other household equipment and utensil manufacturers. Prices are firm.

Detroit, April 2.—Important makers of full finished sheets have their entire second quarter capacity reserved, with specifications in hand against half or more of this tonnage. Pressure occasionally varies according to consumers, but on the whole is as insistent as 30 days ago. Full finished sheets are firm at 4.10c, Pittsburgh. Blue annealed and black sheet demand lacks a little of the vigor of full finished sheets, but never has been heavier in this district. To large users blue annealed generally is quoted at 2.10c, Pittsburgh, and black at 2.85c. Galvanized sheets are 3.60c to 3.70c.

Chicago, April 2.—Sheet buyers in western territory, realizing shortages exist in steel supplies, are ordering sheets farther ahead. Second quarter contracting is well along. Shipments are four to five weeks in black, galvanized and blue annealed. One producer continues to operate on a five-day week basis because of the need of ingot steel in other lines. Recent extension of old prices in the Northwest is said to be disappearing and the price is more firmly established throughout the West and Northwest at the newer quotation. Chicago delivered quotations are 3.10c for No. 24 black, 3.85c for No. 24 galvanized, and 2.35c for No. 10 blue annealed, with quotations $1 a ton lower, f.o.b. Gary and Indiana Harbor mills.

St. Louis, April 2.—Demand for sheets continues to broaden, many users now filing requirements. March sales were well ahead of February. Prices are steady.

Philadelphia, April 2.—Sheet consumption continues heavy, but demand is being supplied largely on shipments against first quarter contracts. Some mills accepted specification right up to the end of March. Tonnages on mill books will care for most requirements during April, and in some instances through part of May. Prices of 2.95c, base, Pittsburgh, for black, and 3.70c for galvanized are considered firm, but so far there has been little test. Blue annealed continues 2.10c to 2.20c, although 2.20c is more general, while in some instances the automotive industry is able to do 2.00c.

Structural Shapes

Subway Work Placed and Pending Involves Large Shape Tonnage—Other Building Work Active—Prices Firm

SUBWAY tonnage in New York is one step nearer realization in that the awarding of a general contract for a 35,000-ton job has been submitted for the board of estimate's approval. While two projects taking 8200 and 4250 tons, respectively, were let, this week's total falls below last week's when four awards averaged more than 10,000 tons apiece. Prospects are bright. Large work is pending in New York, Cleveland, Detroit and Chicago territories. High schools let in New York and Chicago take 3305 and 2200 tons, respectively. Chicago reports an influx of specifications because higher price levels became effective April 1. New plain material levels are firm in most sections, although bids on fabricated material still evidence a hunger for business.

STRUCTURAL SHAPE PRICES, PAGE 939

New York, April 2.—Structural demand continues active, recent awards being topped by 8200 tons of subway work and 4250 tons for a loft building. Numerous other awards involve 500 tons and more. Fresh inquiry is led by two 5000-ton building projects.

With the turn of the new quarter, prices show strength. It is becoming increasingly difficult for consumers to obtain the 2.145c minimum prevailing in recent weeks. Some sellers assert they now are quoting the market firmly at $1 advance over this figure on all new business. Strength is imparted by an exceptionally good month in March and by prospects of further good buying this month. Both mill and fabricating shop deliveries are being steadily extended.

Boston, April 2.—Structural contracts awarded last week aggregated 1700 tons, making a better week than in a long time. The largest, a new home for nurses and a hospital addition at Providence, R. I., involved 520 tons. Prices continue firm. Prospects grow brighter.

Philadelphia, April 2.—On the general run of carload business, the shape market reflects higher prices, usually 1.95c to 2.05c, base, eastern mill, or 2.01c to 2.11c, delivered Philadelphia. On large tonnages differentials under these prices continue to be allowed and in some cases consumers continue able to buy at first quarter prices. Shape mills are booking good tonnages and eastern plants are operating at 70 to 80 per cent.

Pittsburgh, April 2.—Complaint still is heard of slowness of expansion in demand for fabricated structural material. Both inquiry and awards in this district are quiet although specifications for plain material for mills are steady and in fair volume. Fabricators are receiving most business in the shape of small-lot orders and large work is lacking. Some contracts for plain material have been signed for second quarter at 1.95c. Specifications against such contracts, however, are slow.

Cleveland, April 2.—Structural awards in this territory involve inconsequential tonnages. Inquiries are fairly numerous, creating a bright outlook. Mill specifications were active during the closing weeks of last month as buyers worked out of 1.90c, Pittsburgh, first quarter contracts and were permitted to do so until March 31 in several cases. Second quarter contracts are at 1.95c, Pittsburgh. Bidding on material fabricated and delivered is exceedingly keen. A case in point involving but 48 tons, developed the fact that the successful bidder cut his own price to a point where it was $20 per ton below the high bid on the job.

Chicago, April 2.—Structural mills are operating at the heaviest rate in months. Steel fabricators are obliged to watch mill rolling schedules so that their requirements can be placed on convenient rollings. It is pointed out that building work placed during first quarter compares favorably in tonnage volume with awards in the first quarter last year. Over 7000 tons of building work was awarded in the Chicago district and at western and northwestern points during the week. Inquiry is light. A new bridge across the Indiana Harbor canal, East Chicago, Ind., has been authorized. Fabricators' stock material seems to be below normal. The price range is 2.05c to 2.15c, Chicago, for plain structural material, except for tonnage differentials.

Birmingham, Ala., April 2.—Steel fabricating shops are piling up contracts, ranging from 100 to more than 2000 tons each. Steady operations prevail with prospects bright for the future. The Ingalls Iron Works Co. and the Virginia Bridge & Iron Co., the larger shops of Birmingham, have a large unfilled tonnage ahead of them.

Awards Compared

	Tons
Awards this week	44,717
Awards last week	59,635
Awards two weeks ago	48,019
Awards this week in 1928	27,658
Average weekly awards, March	49,265
Average weekly awards, 1928	39,082
Average weekly awards, 1929	38,081
Total awards to date, 1928	572,910
Total awards to date, 1929	543,134

CONTRACTS PLACED

8200 tons, subway section 7, route 109, Brooklyn, to McClintic-Marshall Co., through Hart & Early Inc., general contractor.

4250 tons, column cores for Shroder & Koppel building, Canal and Varick streets, New York, to McClintic-Marshall Co.

3305 tons, textile high school, Ninth avenue, between Eighteenth and Nineteenth streets, New York, to Easton Structural Steel Co.

2300 tons, bridge, Reading railroad, Muncy, Pa., to McClintic-Marshall Co.

2200 tons, John Marshall high school, Chicago, to New City Iron Works.

2150 tons, Jefferson county, Alabama court house, to Ingalls Iron Works Co., through Southern Ferro Construction Co.

1600 tons, two welded pipe shops for A. O. Smith Corp., Milwaukee, to Wisconsin Bridge & Iron Co.

1500 tons, loft, 430 Second avenue, New York, to Paterson Bridge Co.

1350 tons, freight terminal, Pennsylvania railroad, West Philadelphia, Pa., to McClintic-Marshall Co.

1300 tons, municipal and county building, Denver, to Burkhardt & Sons, Steel & Iron Works Co.

1275 tons, girls' trade school, Brooklyn, N. Y., to A. E. Norton Inc.

1100 tons, building, Olds Motor Works, Lansing, Mich., to Jarvis Engineering Co.

900 tons, building for New York Steam Corp., New York, to Post & McCord.

800 tons, bridges, Louisville & Nashville railroad to Virginia Bridge & Iron Co.

750 tons, hotel, 328 East Fifty-sixth street, New York, to Taylor-Fichter Steel Construction Co.

730 tons, loft, Thirty-fourth street and Seventh avenue, New Yor, to McClintic-Marshall Co.

600 tons, hotel, Fairfax, Calif., to Judson-Pacific Co.

520 tons, nurses' home and hospital addition, Providence, R. I., to Providence Iron & Steel Co.

500 tons, St. Joseph's institute, Barrytown, N. Y., to Bethlehem Steel Co.

500 tons, highway bridge, Baltimore, to American Bridge Co.

500 tons, First National bank building, Binghampton, N. Y., to Lehigh Structural Steel Co.

450 tons, paper mill building, International Falls, Utah, to Minneapolis Steel & Machinery Co.

450 tons, board plant at Greeneville, Miss., for Chicago Mill & Lumber Co., to Ingalls Iron Works Co.

415 tons, ethyl lead building, Kearny's Point, N. J., to Belmont Iron Works, through Dupont Engineering Co.

395 tons, building, 309-15 East Thirty-fifth street, New York, to Levering & Garrigues Co.

390 tons, hotel, Cambridge, Mass., to New England Construction Co.

360 tons, public school No. 133, New York, to Lehigh Structural Steel Co.

360 tons, apartment hotel, Beacon street, Boston, to Palmer Steel Co.

350 tons, building, United Light & Power Co., Rock Island, Ill., to Rock Island Bridge & Iron Works.

350 tons, building, Publicker Commercial Alcohol Co., Philadelphia, to Shoemaker Bridge Co.

350 tons, building for International Harvester Co., Dodge City, Kans. to Pittsburgh-Des

Moines Steel Co.
340 tons, building for Commonwealth Edison Co., 10 East Lake street, Chicago, to Duffin Iron Co.
300 tons, crane runway for A. O. Smith Corp., Milwaukee, to Wisconsin Bridge & Iron Co.
300 tons, theater, West Allis, Wis., to unstated interest.
275 tons, state bridges, Vermont, to Berlin Construction Co.
250 tons, public school stadium, Woodlawn, Birmingham, Ala., to Virginia Bridge & Iron Co.
240 tons, building, Edgecomb Steel Co., Philadelphia, to Jones & Laughlin Steel Corp.
230 tons, criminal court building, New Orleans, to Ingalls Iron Works Co.
225 tons, 13-bay extension to hoop mill, Connors Steel Co., Birmingham, Ala., (150 tons) and power house, Hardaway Contracting Co., Norfleet, Fla., (75 tons) to Virginia Bridge & Iron Co.
200 tons, addition to National City bank building, Montague street, Brooklyn, N. Y., to Lehigh Structural Steel Co.
200 tons, store, Hollywood boulevard, Los Angeles, to Consolidated Steel Corp.
200 tons, bridge, Providence, R. I., to Tower Iron Works.
150 tons, building Publicker Commercial Alcohol Co., Philadelphia, to unidentified fabricator.
150 tons, alterations to federal building, Springfield, Ill., to Rochester Bridge Co.
150 tons, Longfellow high school, Yonkers, N. Y., to Kellogg Structural Steel Co., through Kennett McKay, general contractor.
140 tons, Harvard business school administration building, Cambridge, Mass., to New England Structural Co.
125 tons, addition Southern Manganese Co. Anniston, Ala., to Ingalls Iron Works Co.
120 tons, bank building, Providence, R. I., to Tower Iron Works.
112 tons, building for Hupp Motor Car Corp. at Cleveland, to J. E. Moss Iron Works Co.
110 tons, theater, Saenger Co., Colon, Panama, to Ingalls Iron Works Co.
100 tons, plant addition, Tennessee Copper Co., Copper Hill, Henn., to Ingalls Iron Works Co.
100 tons, junior high school, Wenatchee, Wash., to Wallace Bridge & Structural Steel Co.
100 tons, highway bridges, Vermont, to Palmer Structural Steel Co.
100 tons, state highway bridge, Virginia, to Dewey Bros.
100 tons, stores, Nashua, N. H., to Eastern Bridge & Construction Co.
100 tons, powerhouse, state sanitarium, Bridgewater, Mass., to Eastern Bridge & Construction Co.
100 tons, state bridge, Vermont, to Pittsburgh Des Moines Steel Co.

CONTRACTS PENDING

35,000 tons, subway sections 1 and 2, route 103, Manhattan, New York, contract awarding construction to Corson Construction Co. signed by board of transportation and will be submitted for the approval of the board of estimate later in the week.
17,000 tons, United States department of commerce building, Washington; Consolidated Engineering Co., Baltimore, low bidder.
5000 tons, 38-story hotel, West Thirty-seventh street, New York.
5000 tons, Shroeder & Koppel office, 625 Madison avenue, New York.
5000 tons, Columbian Fine Arts building, Jackson park, Chicago, for Rosenwald Industrial museum. Bids rejected, understood new bids will be asked later.
2000 tons, hotel, 305 East Forty-fourth street, New York, George A. Fuller Co., general contractor.
2000 tons, hotel, 306 East Forty-fourth street, New York, George A. Fuller Co., general contractor.
1500 tons, University club, Philadelphia.
1000 tons, addition to Hunter college, New York, previously noted as involving an unstated tonnage.
1000 tons, alterations to armory, Broadway and Columbus avenue, New York.
1000 tons, loft, in West Thirty-seventh street, near Seventh avenue, New York.
1000 tons, mill building, Andrews Steel Co. Newport, Ky.
1000 tons, tire factory in South for General Tire Co., Akron, O., to cost $3,000,000. Bids to be asked soon by William O'Neil, president.
700 tons, bridge for Pennsylvania railroad.
500 tons, theater, Fifty-second street and Stiles avenue, Philadelphia.
500 tons, 6-story garage, 152 East Eighty-seventh street, New York.
500 tons, 2-unit addition, Hoover Suction Sweeper Co., North Canton, O.
450 tons, warehouse, foot of Fourteenth street, Oakland, Calif.; bids April 1.
400 tons, Broadway exchange building, Ohio Bell Telephone Co., Cleveland. Bids closed April 1.
400 tons, St. Mary's school, Philadelphia.
350 tons, Susquehanna river bridge, Columbia, Pa.
300 tons, school, Danville, Pa.
300 tons, bridge for Baltimore & Ohio railroad.
300 tons, transfer bridge for municipal carferry terminal at Milwaukee; general contract to J. C. Theilacker, 5924 Washington boulevard, Milwaukee.
200 tons, building, at Grand Rapids, Mich., for Sears, Roebuck & Co., Chicago.
113 tons, bank building, Greenfield, Mass.
100 tons, lodge building, I. O. O. F., Toledo, O. Bids taken April 1 by E. E. Englehart, 2208 Fulton street, Toledo.
100 tons, assembly and shipping building, Cincinnati Milling Machine Co., Oakley, Cincinnati.
100 tons, 3-story top addition, Widlar Co., Berea road, Cleveland. H. E. Shimmin, architect, taking invitational bids.
Unstated tonnage, bridge across Indiana Harbor canal, East Chicago, Ind. Has been authorized.
Unstated tonnage, engine terminal building, New York Central railroad, Rensselaer, N. Y.
Unstated tonnage, Burnham avenue viaduct, Chicago.
Unstater tonnage, 500-foot South Fourteenth street viaduct, Sheboygan, Wis. Plans completed by Klug & Smith Co., Milwaukee.
Unstated tonnage, lake front stadium, city, of Cleveland. Architectural and engineering contracts awarded by Walker & Weeks and the Osborn Engineering Co., respectively.
Unstated tonnage, Cleveland board of education headquarters building, Cleveland. Plans being drawn by Walker & Weeks, Cleveland, architects.
Unstated tonnage, (estimated at 5000 to 8000 tons) Central-Lorain high level bridge, Cleveland. County commissioners have signed contracts with Franz Warner, engineer, and Frank R. Walker, of Walker & Weeks, architects, for engineering and architectural work, respectively.

Concrete Bars

Price Advances Not Fully Applicable—Numerous Jobs Closed at Old Figures

INAUGURATION of higher levels April 1 was preceded by a spurt in closing up of numerous concrete bar jobs. Eight projects in New York, led by three for subways, aggregated 3400 tons. In Chicago and Cleveland strongly competitive levels hinder closing action, as well as actual application of higher prices named for second quarter. A large amount of work is pending.

REINFORCING BAR PRICES, PAGE 939

New York, April 2.—In announcing an advance of $1 a ton recently concrete reinforcing bar sellers generally extended protection at the old prices to the end of March. As a result bookings the past week have been the largest for some time. Eight jobs alone involved 3400 tons and in addition many small tonnages were placed. The price now is 2.05c, base, Pittsburgh, or 2.39c, delivered New York on shipment at mills' convenience in mill lengths. For mill shipment cut to length, $5 a ton is added.

Pittsburgh, April 2.—Distributors have been adding to their stocks of concrete reinforcing bars more actively during the past few weeks. Although most of this business does not represent actual jobs, the prospects for increased business in the near future are regarded as good. New business in this district still is slow to expand. Awards are quiet but inquiry is slightly heavier. Few specifications as yet have been received applying against higher priced contracts of 2.30c for cut lengths and 2.05c for stock lengths.

Boston, April 2.—The reinforcing concrete bar situation is better. Last week local interests disposed of about 1000 tons, practically all in odd lot tonnages. Prospects are brighter and more optimism is showing. Prices are firmer. The 2.05c, Pittsburgh, base, on mill shipments holds strong and cut lengths are 2.30c. This brings the price here to 2.66½c on round tonnages and 3.26½c on less than 100 tons.

Buffalo, April 2.—Pending tonnage includes a lot of about 400 tons for a Rochester coke oven project. A Buffalo mill and elevator job involves a similar tonnage. Producers look for heavy covering this month. Prices are firm. Production has reached its high point of the year.

Cleveland, April 2.—Several small jobs are up involving 100 to 150 tons of reinforcing concrete bars but larger work is slow to appear. The local price situation is weak, several sellers endeavoring to obtain 2.49c, Cleveland, encounter levels which figure back to 2.00c and even 1.95c, Cleveland, hence competition on each job that comes up is exceedingly keen.

Chicago, April 2.—Some recent sharp competition again has tended to prevent the establishment in full of the higher quotations on billet reinforcing bars and the quotations are in a range of 2.35c to 2.40c. Rail steel bars are 2.00c to 2.05c. March

Awards Compared

	Tons
Awards this week	7,073
Awards last week	6,500
Awards two weeks ago	6,930
Awards this week in 1928	10,403
Average weekly awards, March	6,832
Average weekly awards, 1928	6,189
Average weekly awards, 1929	6,407
Total awards to date, 1928	96,700
Total awards to date, 1929	89,703

awards were not far under last year but fresh inquiry is light. Bids were received yesterday on two junior high schools in Chicago, which will take about 1000 tons.

CONTRACTS PLACED

1250 tons, subway sections 1 and 2, route 110, Brooklyn, N. Y., to McClintic-Marshall Co., through Carleton Co. Inc.
900 tons, plant, Olsen Rug Co., Chicago, to unstated interest.
800 tons, Goldblatt's mail order store, Chicago, to Barton Steel Co. Reported last week as going to unstated fabricator.
750 tons, subway sections 1 and 2, route 103, New York, to Concrete Steel Co., through Corson Construction Co.
525 tons, plant, Westinghouse Electric Co., Emeryville, Calif., to Soule Steel Co.
500 tons, apartment, Reading, Pa., to Hausman Co.
500 tons, warehouse, American Can Co., New Orleans, to Concrete Steel Co.
400 tons, apartment hotel, Evanston, Ill., to Concrete Steel Co.
280 tons, subway section 7, route 109, New York, to Igoe Bros., through Hart & Early Co. Inc.
250 tons, school, Glassboro, N. J., to American Steel Engineering Co.
200 tons, high school, Bronxville, N. Y., to unidentified seller through William Berbusse, Port Chester, N. Y.
200 tons, state hospital building, Orangeburg, N. Y., to Igoe Bros.
200 tons, high school, Des Plaines, Ill., to Truscon Steel Co.
185 tons, hospital, South Flower street, Los Angeles to unstated company.
168 tons, store, Broadway, Long Beach, Calif., to unstated company.
125 tons, bridge over Mill creek, Salem, Oreg., to unstated company.
120 tons, culvert work, Southern Illinois, to Concrete Steel Co.
120 tons, high school, Ossining, N. Y., to Faitoute Iron & Steel Co.
100 tons, power house, A. Atwater Kent Mfg. Co., Philadelphia, to Kalman Steel Co.
100 tons, road work in Indiana, to Olney J. Dean & Co.
100 tons, school in Westchester county, N. Y. to Kalman Steel Co., through Johnson & Miller, Yonkers, N. Y.
100 tons, garage, Rockford, Ill., to Concrete Steel Co.

CONTRACTS PENDING

4000 tons, Susquehanna river bridge, Columbia, Pa.
2300 tons, United States department of commerce building, Washington; Consolidated Engineering Co., Baltimore, low bidder.
1000 tons, building in Pittsburgh for Sears, Roebuck & Co.; Irwin & Leighton Co., Philadelphia, general contractors.
500 tons, City-County building addition, Seattle. Bids April 12.
500 tons, buildings, Dillingham Transport Co., Honolulu, T. H.; bids April 13.
490 tons, school, Arguello boulevard, San Francisco. Bids April 3.
400 tons, coke oven project, Rochester, N. Y.
400 tons, mill and elevator job, Buffalo.
300 tons, building at Washington for Sears, Roebuck & Co., Chicago. General contract to Edward T. Edwards.
300 tons, building at Philadelphia for Sears, Roebuck & Co., Chicago.
185 tons, hotel, Bellingham, Wash. Bids received.
150 tons, apartment building, 700 East End avenue, Chicago.
140 tons, Henry street culvert extension, Whitehorse crossing, Cuyahoga county (Cleveland). Bids in.
125 tons, apartment building, 1200 Stone street, Chicago.
100 tons, Broadway exchange building, Ohio Bell Telephone Co., Cleveland. Bids closed April 1.
100 tons, addition, Standard Envelope Co., Cleveland. Bids in.

Connecticut is using worn out elevator cables for highway guards, fastening them to posts at dangerous points.

Rails, Cars

4500-Car Award Swells March Total—Rail Mills More Active—Fastenings Also Improve

UNDER the wire with 4500 cars, the New York Central swelled March car awards to 12,018 and brought the first quarter total to approximately 41,158, or within 3600 of the entire 1928 total. Western steel mills will book 75,000 tons for car orders placed recently with western builders. Rail and track fastenings mills are operating at capacity.

RAILROAD TRACK PRICES, PAGE 940

New York, April 2.—Preliminary returns indicate that 12,018 freight cars were placed by domestic lines in March. This brings the total for the first quarter up to 41,158, compared with 44,763 during 1928. Two unusually large orders were placed last month, Chicago, Milwaukee, St. Paul & Pacific's 4150 early in the month, and New York Central's 4500 just closed.

Locomotive buying was unusually heavy in March, although not up to the 175 placed last December, when New York Central bought 100.

Bethlehem Steel Co. the past year booked orders from the New York board of transportation 9759 tons of rails for subway installation. About 4000 tons of this has been placed in 1929. Track supplies also are being provided by the Bethlehem company.

Lehigh Valley railroad now is in the market for about 10,000 tons of rails for delivery this year.

Philadelphia, April 2.—Pennsylvania railroad has placed a large tonnage of track bolts, track spikes, angle bars and other track accessories for second quarter delivery.

Pittsburgh, April 2.—Railroads are more active in taking track fastenings to be used in new rail laying. Demand for such material is more urgent than for replacement requirements. Mill operations in this district are slightly heavier than a year ago. The 2.80c, Pittsburgh, price for railroad spikes is well maintained on new business. Car builders in this district shared to the extent of 2000 cars in the recent awards of the New York Central railroad.

Cleveland, April 2.—In addition to the other equipment it is purchasing, the Nickel Plate railroad is taking bids on four Hudson river type locomotives. Bids are being considered from the Lima Locomotive Works and others.

Chicago, April 2.—Specifications from the car building shops have reached important volume. A dip was noted in the week just closed but it is expected specifications will develop more momentum from now on. Of the 4500 cars awarded by New York Central, 2500 will be built in western shops. Of the Northern Pacific's 1300-car inquiry, 500 gondolas were awarded here. These two orders add 75,000 tons of steel to western mill books. Pacific Fruit Express is inquiring for 600 underframes for refrigerator cars.

Heavy specifications for track fastenings are being entered, aggregating about 15,000 tons. This largely represents quarterly requirements of one large road. Track fastenings departments are at capacity. The price of $43 for tie plates has been shaded in the Southwest.

From 3500 to 4000 tons of rails has been awarded by a western road as secondary tonnage. No important rail inquiry is out.

CAR ORDERS PLACED

Baldwin Locomotive Works, six air dump cars, to Magor Car Corp. and American Car & Foundry Co.
Boston & Albany, 500 70-ton hoppers, to Standard Steel Car Co.
Louisville & Nashville, four diners, to American Car & Foundry Co.
New York Central, 4500 miscellaneous freight cars, distributed as follows: 1000 box, American Car & Foundry Co., 1000 gondolas to Pressed Steel Car Co., 500 gondolas to General-American Tank Car Co., 1000 automobile box cars for Michigan Central to Pullman Car & Mfg. Corp., 500 box for Pittsburgh & Lake Erie to Standard Steel Car Co. and 500 hopper cars for Boston & Albany, to Standard Steel Car Co. Action on 70 passenger cars is expected this month.
Northern Pacific, 500 gondolas to American Car & Foundry Co.

LOCOMOTIVE ORDERS PLACED

Central Railroad of New Jersey, five switch engines to Baldwin Locomotive Works.
Manila Railway, Philippines, six locomotives, to Baldwin Locomotive Works.

CAR ORDERS PENDING

American Rolling Mill Co., five steel flat cars and five low-side steel gondola cars.
Anglo-Chilean Consolidated Nitrate Corp., New York, 100 steel ore cars for export to Chile.
Bureau of Supplies and Accounts, United States navy department, 50-ton gondola car for Great Lakes navy station.
Chicago & North Western, inquiring for 24, 48 or 72 steel suburban coaches.
Pacific Fruit Express, 600 underframes for refrigerator cars.
Southern Pacific, 21 gasoline-electric rail motor cars.

LOCOMOTIVE ORDERS PENDING

Akron & Barberton Belt, three switch engines.
Chicago, Indianapolis & Louisville, 10 locomotives.
Nickel Plate, four Hudson river type locomotives. Bids taken.
Southern Pacific, eight locomotives and 10 extra locomotive tenders.
Standard Oil Co. of Indiana, two switch engines.

Wire

Better Demand Experienced—Manufacturers' Wire Most Active—Buy for Second Quarter

WIRE producers find demand much improved and March brought Chicago mills a record tonnage. Manufacturers' wire remains in the lead but other forms are bringing heavy requirements. Contracting for second quarter is proceeding at a good rate at prices that prevailed in first quarter. Welded mesh and fencing are furnishing considerable tonnage to mills.

WIRE PRICES, PAGE 940

Chicago, April 2.—Further important contract tonnage has been booked. Specifications for manufacturers' wire continue active. One producer reports the best shipments and specifications since war years. March orders and specifications for wire products in general were ahead of a year ago, which increased the average for first quarter to virtually the same volume as in first quarter, 1928.

In general farm buying of woven fencing and wire nails is improving. Prices for wire products are reported steady on the basis of 2.55c, Chicago or western mills, for bright plain wire, and $2.70 for wire nails to large jobbers.

Worcester, Mass., April 2.—Contracts and specifications against second quarter business have stepped up at firm prices on a basis of 2.75c, Worcester base, for plain wire to dealers. Specialties and manufacturers' materials lead, although a brisk demand for utilities has been noted. Mills are generally operating around 60 to 65 per cent, with stocks low.

Buffalo, April 2.—Demand for all wire, particularly welded mesh for concrete construction, is good. Specifications are coming forward freely. Base prices are being maintained with unusual firmness.

Pittsburgh, April 2.—Although demand for wire nails and fencing material is expanding, manufacturers' wire continues the most active item. March business showed an expansion over February but total demand is no more than average for this period. Contracting for second quarter is well advanced, with first quarter prices of 2.50c to 2.60c for plain wire and $2.65 to $2.75 for wire nails continuing and firmly held.

Cleveland, April 2.—Augmenting their stocks for spring demands, jobbers of nails and wire are making increased demands upon the mills. Orders on the new price bases are growing. Wire in all varieties, except possibly barbed, is ordered liberally, large quantities going to automotive and related lines. Nut, bolt and rivet manufacturers order heavier gages in larger quantities. Operations average about 75 per cent.

Harry F. Brinkerhoff, president of the Brinkerhoff Brass & Bronze Co., New York, died recently at his home in Brooklyn, at the age of 73 years.

Cold Finished Steel

Backlogs Comfortable and Specifications Continue Heavy

COLD FINISHED PRICES, PAGE 940

Pittsburgh, April 2.—Producers of cold finished steel bars have comfortable backlogs and business now on books will run them well through April. Recent specifications from automotive interests show no slackening from the active demand that has prevailed since the first of the year. Producers generally are encountering no trouble in meeting shipping requirements of most consumers, with the result that current business represents material required immediately. The market is well maintained at 2.30c, Pittsburgh, and little shading is encountered at this figure, an advance of $2 over first quarter.

Detroit, April 2.—Cold finished bars seem intrenched at 2.30c, Chicago, or 2.575c, delivered Detroit. Specifications continue practically equal to makers' capacity, though not lengthening mill backlogs.

Cleveland, April 2.—After a dull period following the March 15 deadline for specifications against 2.25c, Cleveland, first quarter contracts on cold finished bars, which was generally observed, specifications are commencing to arrive on 2.35c, Cleveland, arrangements for the current quarter.

Strip

Specifications Equal to Production and Backlogs Are Not Reduced—New Prices Opposed

MAKERS of strip steel have received such heavy specifications during March that the unusual production by mills has not sufficed to reduce backlogs and hasten time of delivery. June is the best possible date on some sizes. Four weeks earliest on any order. Some buyers oppose prices but in general they are holding steadily. Contracting for both grades nears completion.

STRIP PRICES, PAGE 940

Pittsburgh, April 2.—Heavy specifications for strip steel during the latter part of March hold mills' backlogs to the peak of several weeks ago despite the fact that production has been at capacity for a number of weeks. On some sizes of hot strip, mills are offering early June delivery while for most sizes of both hot and cold rolled material shipment cannot be effected in less than four to five weeks. Some mills are being handicapped by lack of sufficient raw steel. Despite some opposition to new prices the market generally is firm at 1.90c and 2.00c for hot strip over 6-inch to 24-inch, and sizes under 6-inch. respectively, with cold strip at 2.75c to 2.85c. Contracting is nearing completion on both of these grades.

Cleveland, April 2.—In several directions, the week of June 3 is the earliest that hot strips of any kind, wide or narrow, can be obtained. In one or two places, wide material can be shipped in late May but narrow mills are heavily obligated everywhere. The 1.90c to 2.00c, Pittsburgh, levels prevail firmly. Cold strip tonnage consumed here is not as heavy as hot. Material ordered, however, is wanted immediately and deliveries named usually are four to five weeks deferred.

Detroit, April 2.—Meeting delivery requirements rather than soliciting new business is the task of strip sellers. One important interest has specifications backed up eight weeks. Pickled and oiled strip demand in particular greatly exceeds the supply. Hot strip is generally quoted at 1.90c to 2.00c, Pittsburgh, depending on width. Cold rolled strip is 2.75c to 2.85c, Cleveland, and almost measures up to hot rolled in point of deferred delivery.

Orders Mill Replacement

Warren, O., April 2.—Work has started at the Trumbull works of the Republic Iron & Steel Co. in converting hot sheet mills Nos. 21, 22, 23, 24 and 25 into tin mills, making 24 tin mills in all at this plant. At the same time two jobbing mills, Nos. 33 and 34, will be torn out and replaced with two new sheet mills, while two other sheet mills also will be added. Formal notice of these changes has been given the crews manning the above mills by Superintendent Elliott.

Nonferrous Metals

New Buying Eases Off but Prices Hold Steady—Copper Consumers Well Covered on Needs Into Future—Lead More Stable

Prices of the Week, Cents a Pound

	Copper: Electro delivered	Copper: Lake delivered	Copper: Casting refinery	Straits Tin: New York Spot	Straits Tin: New York Futures	Lead: New York	Lead: East St. Louis	Zinc: St. Louis	98-99% Aluminum	Spot Antimony	Ingot Nickel
Mar. 27	24.00	24.10	23.75	48.87½	48.87½	7.87½	7.67½	6.77½	23.90	9.70	35.00
Mar. 28	24.00	24.10	23.75	48.87½	48.87½	7.80	7.65	6.77½	23.90	9.62½	35.00
Mar. 29	24.00	24.10	23.75	48.87½	48.87½	7.75	7.65	6.77½	23.90	9.62½	35.00
Apr. 1	24.00	24.10	23.75	48.75	48.80	7.75	7.65	6.80	23.90	9.62½	35.00
Apr. 2	24.00	24.10	23.75	48.62½	48.62½	7.75	7.65	6.80	23.90	9.75	35.00

NEW YORK, April 2.—Nonferrous metal markets have quieted down. New buying was light in the past week and prices showed practically no change. This situation was natural after the big buying of recent weeks and the thorough way in which users now are covered for spring requirements.

Brass and copper rolling mills continue rushed to capacity, with shipments requiring from two weeks to two months. Production by the mills in March probably was much above that of any month in history. The business is well distributed among all shapes and all classes of buyers. Prices of mill products have been unchanged in the past week.

Affairs in Mexico continue to be of importance to the metal markets, especially copper and lead. The movement of metals out of that country is retarded.

Copper—Business has been practically at a standstill, with users unusually well covered ahead and holiday letup in Europe of greater duration than here. Producers' prices are firm at 24.00c, Connecticut. A small amount of second-hand metal was offered for less. Some of it was taken quickly and little was heard about the remainder. Stocks of copper are extremely low. The March statistics are expected to show a cut in stocks with output and shipments above average.

Zinc—Prime western has sold up to 6.80c, East, St. Louis, and some asking prices are 5 points higher. Some business also was done in the past few days at 6.75c. With the ore market going up $1.50 to $44 a ton on Saturday, the metal market became very firm but did not show any immediate change, as the ore price rise had been expected and was discounted. The spread in price between a ton of ore and the metal produced from it, on the basis of $44 and 6.80c, is $24. This is the widest in a long time. There is some expectation that the price of ore will go to $45 on account of the strongest situation in ore which has obtained for a long time. In this event, prime western slab probably will advance somewhat. Users seem to be well covered for spring requirements on prime western, and the last advance was mostly on July sales. High grade has gone to 8.25c, delivered.

Tin—This market has held unusually well in the past week in the face of moderate buying and break in the stock market. The price, however, is down to a level where there is great resistance to any further drop. Domestic deliveries in March were extraordinarily large at 8175 tons. This made 23,700 for the first quarter of the year or 4000 tons more than a year ago and several thousand tons above any other first quarter. Stocks here at the end of the month were 1550 tons, a cut of nearly 1800 tons in the month.

Lead—The lead market has become more stable. With prices held firmly at one level by the largest producers, a runaway market has been prevented. For several days last week there were premiums paid far above prices of the leading producers but they have about, if not entirely, disappeared. The situation, however, continues strong.

Aluminum—Sales and shipments are unusually large but prices are unchanged.—*Daily Metal Trade.*

Mill Products

Base prices cents per pound f.o.b. mill, except where otherwise specified

SHEETS	
Yellow brass (high)	27.12½
Copper, hot rolled	33.75
Lead, full sheets (cut ¼c more)	10.50
Zinc sheet (100-pound base)	$10.00
Zinc strip (100-pound base)	$9.00
Aluminum, flat sheets, up to 10 gage, 3" to 72" wide	31.30
SEAMLESS TUBE	
Yellow brass (high)	32.00
Copper	35.12½
RODS	
Yellow brass (high, full turnings)	24.87½
Naval brass	27.50
WIRE	
Copper	25.87½
Yellow brass (high)	27.62½

Old Metals

Dealers' buying prices, cents per pound

HEAVY RED BRASS	
New York	14.50 to 14.75
Chicago	15.00 to 16.00
Cleveland	16.75 to 17.00
HEAVY YELLOW BRASS	
Cleveland	11.75 to 12.00
ZINC	
New York	3.75 to 4.00
Cleveland	3.25 to 3.50
HEAVY COPPER AND WIRE	
New York	17.50 to 18.00
Boston	17.50 to 18.50
Chicago	17.50 to 18.00
Cleveland	19.75 to 20.00
RED BRASS BORINGS	
New York	12.50 to 12.75
YELLOW BRASS TUBING	
Cleveland	11.75 to 12.00
LIGHT COPPER	
New York	15.50 to 16.00
Chicago	15.75 to 16.25
Cleveland	17.75 to 18.00
LIGHT BRASS	
Boston	9.50 to 10.00
Chicago	11.00 to 11.50
Cleveland	9.75 to 10.00
ALUMINUM	
Clippings, Cleveland	18.00 to 18.50
Borings, Cleveland	9.50 to 10.00
Cast, Cleveland	12.75 to 13.00
Cast, Boston	10.50 to 11.00

Secondary Metals

Remelt aluminum No. 12	17.00 to 17.50
Brass ingot, 85-5-5-5	22.00 to 22.25

Coke By-Products

Little Buying, But Contract Movement Is Good and Prices Hold

New York, April 2.—Both quotations and volume of buying continue steady in the light oil distillates market. The rubber industry still absorbs large quantities of benzol, and the lacquer industry, as an outstanding consumer, heavy quantities of toluol. This industry also is taking good quantities of commercial xylol and is a moderately good purchaser of solvent naphtha.

Leading consumers of naphthalene are now fairly well covered on their spring requirements; nevertheless, there is sufficient volume of scattered buying to give trading an active aspect. Meanwhile, prices are firm.

Coke Oven By-Products

Per Gallon at Producers' Plant in Tank Lots

	Spot
Pure Benzol	$0.23
90 per cent benzol	0.23
Toluol	0.40
Solvent naphtha	0.30
Commercial xylol	0.30
Per Pound at Producers' Plants in 250-Pound Drums	
Phenol	0.17
Per Pound at Producers' Plants	
Naphthalene flakes	0.05½ to 0.06½
Naphthalene balls	0.06½ to 0.07½
Per 100 Pounds Delivered	
Sulphate of ammonia	$2.30

Quicksilver Holds Firm

New York, April 2.—Quicksilver is moderately active and firm at $124 to $125 a flask. Not much is obtainable at the lower figure.

Warehouse

April Buying Starts Well—Demand Grows More Diversified, Both as to Products and Use—Price Trend Is Toward Firmness

SPRING demands upon warehouses are unusually heavy this year. the mill delivery situation being tighter than at any time during the past several months. Diversified lines of manufacture failing to obtain material from their mill sources of supply within the time desired, depend upon the jobbers to bridge the gap.

Pittsburgh—March sales showed an increase over February. Prices on sheets and cold-finished material have advanced $2 a ton. Cold-rolled rounds and hexagons are 3.70c, and flats and squares 4.20c. New sheet prices are 3.95c on black, 4.95c on galvanized, and 3.45c on blue annealed, all for lots of less than 25 sheets.

New York—Trading in the local warehouse market continues active. A marked improvement is noted over two weeks ago. While prices are strong, reflecting increased activity and the upward tendency at the mills, no changes have been announced.

Buffalo—No letup is apparent. First quarter sales exceeded those of the same period of 1928 by 5 to 10 per cent. Prices are firm and individual orders a little larger.

Cleveland—From the way April starts out, warehouse demand bids fair to sustain the March high total. One mill warehouse billed out more material in March than in any one month since 1917. Leading jobbers of sheets do not recognize concessions by small sellers of black and galvanized, who quote as low as 3.50c and 4.25c, respectively, but do not always sort the sheets. Blue annealed is strong at 3.25c.

Detroit—Warehouse business exceeds the level of a year ago, though not reflecting as much as expected the deferred delivery situation of mills. Structural material is moving better.

Chicago—Lengthened mill deliveries bring steadily growing orders to steel warehouses. March sales were slightly ahead of March, 1928. Common sheet grades are approaching the activity in full finished sheets. Bar and light mill products are steady.

Cincinnati—Warehousemen in this district look forward to increasing business as the warmer weather makes outside work possible. Prices continue at present levels.

St. Louis—Distributors of iron and steel commodities from stock report business distinctly good. Purchasing in the South and Southwest particularly is in satisfactory volume.

Philadelphia—First quarter sales for jobbers here are reported variously at 10 to 20 per cent higher than a comparable period in 1928. Prices are unchanged and firm.

Warehouse Quotations in Cents Per Pound at Leading Market Centers

STEEL BARS

Baltimore	3.10c
Boston	3.265c
Buffalo	3.30c
Chicago	3.00c
Cincinnati	3.30c
Cleveland	3.00c
Detroit	3.00c
Ft. Worth	3.75c
Houston	3.00c
Los Angeles	3.30c
New York†††‡	3.25c
Philadelphia*	2.80c
Pittsburgh	2.90c
Portland	3.00c
San Francisco	3.15c
Seattle	3.00c
St. Louis	3.15c
St. Paul	2.25c
Tulsa	3.75c to 4.04c

IRON BARS

Baltimore	3.10c
Boston	3.265c
Buffalo	3.30c
Chicago	3.00c
Cincinnati	3.30c
Detroit	3.00c
Ft. Worth	3.75c
New York††	2.80c to 3.24c
Philadelphia*	2.80c
St. Louis	3.15c
Tulsa	3.75c to 4.04c

REINFORCING BARS

Baltimore	3.31c
Boston	3.265c to 3.50c
Buffalo	2.75c
Cincinnati	3.15c
Cleveland	2.25c to 2.44c
Detroit	2.30c to 3.00c
Ft. Worth	3.50c
Houston	3.00c
Los Angeles cl.	2.65c
Los Angeles lcl.	3.00c
New York	2.90c to 3.30c
Philadelphia	2.75c to 3.10c
Pittsburgh	2.90c to 3.175c
San Francisco cl.	2.00c
San Francisco lcl.	2.25c
Seattle	3.00c
St. Louis	3.15c
Tulsa	3.75c to 4.00c
Youngstown	2.30c to 2.60c

STRUCTURAL SHAPES

Baltimore	3.10c
Boston	3.365c
Buffalo	3.40c
Chicago	3.10c
Cincinnati	3.40c
Cleveland	3.00c
Detroit	3.10c
Ft. Worth	4.00c
Houston	3.25c
Los Angeles	3.30c
New York†††‡	3.25c to 3.30c
Philadelphia*	2.70c
Pittsburgh	3.00c
Portland	3.00c
San Francisco	3.15c
Seattle	3.00c
St. Louis	3.25c
St. Paul	3.35c
Tulsa	3.75c to 4.14c

PLATES

Baltimore	3.10c
Boston	3.365c
Buffalo	3.40c
Chicago	3.10c
Cincinnati	3.40c
Cleveland, ¼-in. and thicker	3.00c
Cleve., 3/16-in.	3.20c
Detroit	3.10c
Detroit, 3/16-in.	3.30c
Ft. Worth	4.00c
Houston	3.00c
Los Angeles	3.30c
New York‡‡	3.30c
Philadelphia*	2.70c
Phila., 3/16-in.*	2.90c
Pittsburgh	3.00c
Portland	3.00c
San Francisco	3.15c
Seattle	3.00c
St. Louis	3.25c
St. Paul	3.35c
Tulsa	3.75c to 4.14c

NO. 10 BLUE ANNEALED

Baltimore	3.45c
Boston 5/16-in.	3.915c
Buffalo	3.50c
Chicago	3.35c
Cincinnati	3.45c
Cleveland	3.25c
Detroit	3.35c
Ft. Worth	4.50c
Houston	3.90c
Los Angeles	4.00c
New York‡‡	3.90c
Portland	3.75c
Philadelphia*†	3.25c
Pittsburgh**	3.35c to 3.45c
San Francisco	3.80c
Seattle	4.00c
St. Louis	3.45c
St. Paul	3.75c
Tulsa	4.20c to 4.34c

NO. 24 BLACK SHEETS

Baltimore	3.25c to 4.00c
Boston	4.85c
Buffalo	4.20c
Chicago	3.80c
Cincinnati	3.90c
Cleveland	3.60c
Detroit	3.95c
Ft. Worth	4.70c
Los Angeles	4.90c
New York	3.90c to 4.00c
Philadelphia*†	4.10c
Pittsburgh**	3.85c
Portland	4.90c
San Francisco	4.90c
Seattle	5.00c
St. Louis	4.25c
St. Paul	3.95c
Tulsa	4.34c

NO. 24 GALVANIZED SHEETS

Baltimore	4.30c to 4.50c
Boston	5.60c
Buffalo	4.70c to 4.85c
Chicago	4.65c
Cincinnati	4.75c
Cleveland	4.35c to 4.45c
Detroit	4.75c
Ft. Worth	5.50c
Houston	5.30c
Los Angeles	5.30c
New York	4.75c
Philadelphia*†	4.85c
Pittsburgh**	4.85c to 4.95c
Portland	5.50c
San Francisco	5.30c
Seattle	5.50c
St. Louis	5.10c
St. Paul	4.90c
Tulsa	5.10c to 5.35c

BANDS

Baltimore	3.85c
Boston	4.015c to 5.00c
Buffalo	3.65c
Chicago	3.20c
Cincinnati	3.50c
Cleveland	3.25c to 3.65c
Detroit, 1/8-in. and lighter	3.30c
Ft. Worth	4.25c
Houston	3.65c
Los Angeles	4.15c
New York‡‡	3.75c
Philadelphia*	3.15c
Pittsburgh	3.25c
Portland	4.00c
San Francisco	3.75c
Seattle	4.00c
St. Paul	3.50c
Tulsa	4.50c to 4.69c

HOOPS

Baltimore	4.00c
Boston	5.50c to 6.00c
Buffalo	4.05c
Chicago	3.75c
Cincinnati	4.05c
Cleveland	3.25c to 3.65c
Detroit, No. 14 and lighter	3.80c
New York‡‡	4.25c
Philadelphia*	3.40c
Pittsburgh	4.25c
Seattle	5.00c
St. Paul	4.00c

COLD FINISHED STEEL

	Rounds, hexagons,	Flats, squares
Baltimore (c)	3.35c	3.85c
Boston	3.55c	4.05c
Buffalo	3.95c	4.45c
Chicago	3.60c	4.10c
Cincinnati	3.85c	4.35c
Cleveland	3.65c	4.15c
Detroit	3.85c	4.35c
Los Angeles (a)	4.50c	.....
New York	3.60c	4.10c
Philadelphia*	3.60c	4.00c
Pittsburgh	3.70c	4.20c
Portland (a)	4.50c	.....
San Fran. (a)	4.25c	.....
Seattle (a)	5.00c	.....
St. Paul (a)	3.85c	.....
Tulsa	4.64c	5.14c

(a) Rounds only.

COLD ROLLED STRIP

Boston, 0.100-inch, 500 pound lots	5.30c
Buffalo	5.85c
Chicago (b)	6.10c
Cincinnati	7.15c
Cleveland (b)	5.95c
Detroit	5.80c
New York	5.15c
Philadelphia (c)	5.15c

(b) Net base, straightening, cutting, boxing 1 ton or more.
(c) Plus mill, size and quantity extras.

SWEDISH IRON AND STEEL

New York duty paid

Hollow drill steel	13.00c
Iron bars, round	6.10c
Iron bars, flats and squares	6.50c

*Plus quantity differentials. ‡‡Minus quantity differentials. ††Domestic bars. **Less than 25 sheets. *†50 or more bundles.

Pacific Coast

Sales Heavier Than Last Year—New Projects Are Appearing—Prices Steady

EXCEPT for reinforcing bars, bookings of steel products at San Francisco were larger for first quarter than for the same period last year. The margin of gain is considerable. Steady appearance of new projects is keeping the market active. A number of bids under consideration are about to be awarded. Prices are holding well at recently advanced levels.

San Francisco, March 30.—(By Air Mail)—Steel bookings during first quarter except reinforcing steel bars, were considerably heavier than for the corresponding quarter in 1928. From present indications bookings for first half will be in excess of the tonnage placed during first half of 1928. Most awards this week were in structural shapes and cast iron pipe.

Pig Iron and Coke

Movement of foundry pig iron and coke was confined to unimportant lots and no large inquiries came up for figures. Foundry pig iron prices are unchanged.

Bars, Plates and Shapes

Concrete bar awards this week totaled 1571 tons. Important awards this week involved 525 tons for the Western Electric Co. plant in Emeryville, Calif., booked by Soule Steel Co. Among pending projects are 490 tons for a school in San Francisco and 185 tons for a hotel at Bellingham, Wash. Prices on out-of-stock material continue 2.20c to 2.30c base on carload lots and as high as 2.60c on less than carload lots. Merchant bar material is not in heavy demand, most sales and inquiries involving small tonnages composed of numerous sizes. On this class of material 2.35c c.i.f. appears to be firm.

Matson Navigation Co., San Francisco, has not, as yet, made a decision on the bids opened last week for two ships involving 13,200 tons of plates, but it is thought it will reject all bids as being too high. Awards this week were all confined to lots of less than 100 tons. During the first quarter of this year 55,832 tons were placed as compared with 9442 tons for the same period last year. No award has yet been made on 1691 tons for a syphon at Ellensburg, Wash., bids on which were opened March 5. Sierra Madre, Calif., will open bids April 9 for 240 tons of 4 to 16-inch riveted or welded pipe and will consider alternate bids on cast iron pipe. Prices continue untested at 2.35c c.i.f.

Demand for structural shapes continues well sustained and awards for the past week aggregated 2432 tons and brought the total for the first quarter of the year to 54,342 tons, compared with 50,487 tons for the corresponding period in 1928. Awards included 600 tons for a hotel at Fairfax, Calif., booked by the Judson-Pacific Co. and 200 tons for a store on Hollywood boulevard, Los Angeles, placed with the Consolidated Steel Corp. Bids will be opened next week on 445 tons for a warehouse for the Oakland port commission. Plain shapes remain firm at 2.35c c.i.f.

Other Finished Material

Cast iron pipe awards during the week totaled 3779 tons and brought the aggregate for the first quarter of the year to 31,828 tons as compared with 21,811 tons for the same period last year. The United States Cast Iron Pipe & Foundry Co. secured 1480 tons for Los Angeles, 164 tons for Eugene, Oreg., and 113 tons for Monterey Park, Calif. C. G. Claussen & Co. took 205 tons for Los Angeles and Eugene, Oreg., awarded 351 tons to the National Cast Iron Pipe Co. New inquiries include 405 tons for San Bernardino, 819 tons for Sierra Madre, Calif., and 176 tons for the county of San Bernardino. The Southern Pacific Co. has made no award as yet on its inquiry for 2242 tons of 12-inch cast iron pipe and it is stated that lapweld tubing may be purchased in place of cast iron pipe.

Coast Pig Iron Prices

Utah basic	$25.00 to 26.00
Utah foundry	25.00 to 26.00
*German	24.25
*Indian	24.00 to 25.00

*C.i.f. duty paid.

Fair Trade at Seattle

Seattle, March 27.—Conditions in the iron and steel markets of the Pacific Northwest have developed a fair turnover with much business scheduled for early action. Prices are holding firm and there is little complaint of underselling.

Pig Iron and Coke

The pig iron market is holding firm with higher prices, recently announced, now in effect, except for buyers who hold contracts for first half. No. 1 Columbia is selling at $27 while Burn India iron is up to $25.75 and $26. Some of the latter has been purchased for third quarter delivery. Foundrymen are paying more attention to low grades of pig iron which some of them are buying instead of cast iron scrap. Activity in the foundry industry in the Northwest is being well maintained with sawmill, cannery, logging and marine work somewhat greater than normal.

Bars, Plates and Shapes

Mill prices are unchanged, merchant bars, shapes and plates at 2.35c and reinforcing at 2.20c. No large tonnages of plates have been up for figures since the advance in this item from 2.25c went into effect and the new level has not been really tested. Manufacturers' agents believe it can be maintained. The two local steel mills report unchanged operations. Several large reinforcing jobs are about to be let but nothing over 100 tons was booked this week. The state has awarded the general contract for an overhead railroad crossing in Benton county, involving about 100 tons of reinforcing steel.

There is not much inquiry for steel plates in large tonnages in this district only two small jobs being up for figures. One involves about 110 tons in an outlet pipe in connection with Tacoma's Lake Cushman project and the other less than that amount in a pipe job at Port Townsend. Steel manufacturers were disappointed that a reclamation bureau project crossing the Yakima river is to be accomplished by means of a tunnel involving an unnamed tonnage of reinforcing steel. The alternate plan called for a siphon requiring 1700 tons of plates. Wholesalers are selling a fair tonnage of light gage plates for general construction and repair work.

While several fair sized projects involving shapes are up for award in the near future the only job booked this week was taken by Wallace Bridge & Structural Steel Co. This amounts to 100 tons in a junior high school at Wenatchee. The same plant is fabricating 160 tons for the addition to the Rainier club, Seattle, the general contract for which has just been let to Teufel & Carlson.

Pipe Sales Are Good

Cast iron pipe agencies report an active demand with considerable important tonnage up for action in the near future. Awards this week totaled more than 2500 tons, of which the largest contract, 2173 tons for a Tacoma improvement job, went to French manufacturers through Paine & Galucci, general contractors. United States Cast Iron Pipe & Foundry Co. took 325 tons for Wenatchee, Wash., in strong competition with foreign interests. Contract for 120 tons for Astoria, Oreg., went to McWane.

Old Materials

Because some local foundries have turned to cheap pig iron in lieu of cast iron scrap, the latter market is slightly lower, average prices declining from the high level of $14.50, net ton, to $14, net. This material continues scarce although demand for it is not heavy. Cheaper grades are being bought at $12, net ton, and up. Steel scrap is unchanged at $10 and $11, gross, at local mills, receipts being quite heavy at this season.

Payrolls Advance Faster Than Employment

Washington, April 2.—Iron and steel employment and payrolls increased in February, compared with January, according to the bureau of labor statistics. Reports from 206 iron and steel plants gave their January employment as 273,186, increasing in February to 274,772 or 0.6 per cent. The payrolls in these plants increased from $8,575,202 in January to $9,991,985 in February, a gain of 4.9 per cent.

Reports from 164 structural ironwork plants gave their January employment as 25,434, decreasing in February to 25,418, or 0.1 per cent. Their payrolls increased from $731,639 to $753,698, or 3 per cent.

One hundred forty-four machine tool plants reported their January employment as 36,912, increasing in February to 38,210, or 3.5 per cent. Their payrolls increased from $1,206,889 to $1,290,328, or 6.9 per cent.

Reports from 37 cast iron pipe plants gave their January employment as 10,925, decreasing in February to 10,286, or 5.8 per cent. Their payrolls increased from $236,149 in January to $247,694 in February, or 4.9 per cent.

H. W. Thompson Is Dead

H. W. Thompson, 52, Cleveland, the past 18 months assistant to president in charge of sales for the Lovell Mfg. Co., Erie, Pa., died March 31 in New York. From 1907 to 1925 Mr. Thompson was affiliated with Bardons & Oliver, Cleveland, and for two years thereafter, he was with the Trundle Engineering Co. He was a member of the American Society of Mechanical Engineers.

Bolts, Nuts, Rivets

Second Quarter Contracting Practically Completed

NUT AND BOLT PRICES, PAGE 940

Pittsburgh, April 2.—Second quarter contracting for bolts, nuts and rivets practically is completed. New contracts were written at unchanged prices of 60 to 70 off for bolts and nuts and 3.10c, Pittsburgh, for large rivets, an advance of $4 a ton. March specifications were active, showing a fair gain over February. Jobbers have been more liberal in commitments recently. Operations are steady.

Chicago, April 2.—Gains are being shown in specifications for bolts and nuts. Rivet orders are slow because of inactivity in many lines of building. Bolt and nut prices continue steady at 60 to 70 per cent off list, and large structural rivets are 3.20c, Chicago.

Philadelphia, April 2.—The 3.10c, base, Pittsburgh price now is generally in effect on rivets. So far little actual buying has been done at this price, because consumers and jobbers are well supplied as a result of their heavy first quarter specifications.

Iron Ore

Market Active—Vessel Rates Reaffirmed—Ford Tonnage Pending

IRON ORE PRICES, PAGE 940

Cleveland, April 2.—All indications point to a brisk movement of iron ore this year, and firm prices. With vessel rates for the season re-established on last year's basis, the ore producers reap the full benefit of the increase of 25 cents a ton in the price of ore, in a year when shipments are forecast at 60,000,000 tons. Vessel interests this year will profit from the increase in tonnage. Some producers say 2,000,000 to 3,000,000 tons of ore has been purchased in the open market at the new prices. Most consumers have long-term contracts against which they specify. The open market prices are the basis on which the terms for 1929 are figured. A number of steel companies, however, recently came into the market for additional tonnages, and are reported to have paid the full open market prices. The Ford Motor Co. has not yet closed on its inquiry for 354,000 tons.

Mine operations will be increased this year by leading producers. Shipments will begin as early as weather conditions will permit. It is reported from Marquette that a new steel and concrete ore dock to cost $2,000,000 will be built there this year for the Duluth, South Shore & Atlantic railroad, to replace a wooden structure in use since 1905. A record year in the shipment of ore from the Wisconsin-Michigan district is predicted by E. A. Lalk, general agent for the Chicago, Milwaukee, St. Paul & Pacific railroad. Docks are reported depleted and movement of ore from mines to docks will begin before April 15.

Color Adds Touch of Distinctiveness

AT SEVENTH avenue at Thirty-seventh street, New York, is arising a steel frame for a new skyscraper and it is being painted a bright yellow. The job is being executed by the Hay Foundry & Iron Works, New York, and hereafter this coating of yellow will designate its work throughout the city.

Structural steel usually arrives on the location painted a dull red for preserving its surface and as the steel is erected the red is painted over with a coat of black. The Hay company, however, has decided to break with tradition and will paint all of its erected steel a vivid yellow. The new color application makes its first appearance in connection with the steel erection on the Louis Adler building in New York, which is being erected on the site formerly occupied by the Pictorial Review building.

The yellow steel frames will project several hundred feet into the sky and will be visible for miles around, even from vantage points in New Jersey and neighboring suburbs.

Pig Iron

(*Concluded from Page* 941)

tons, the rest being southern grades. The largest single transaction was 2500 tons of malleable, taken by a nearby Illinois interest. An Iowa specialty maker engaged 500 tons of foundry, and 700 tons were purchased by a jobbing foundry in that state. Prices are firm.

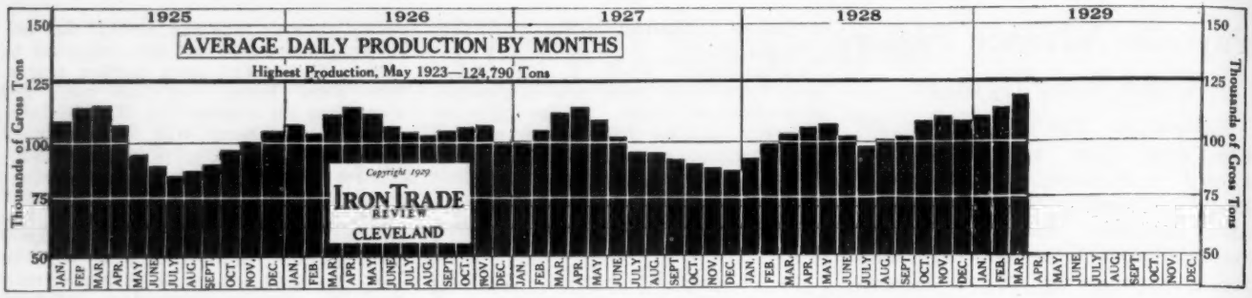
Birmingham, Ala., April 2.—Sales of pig iron iron are reported at the new low prices for delivery in Ohio river territory. The price, $15.50, base, Birmingham, however, has not developed the demand that was anticipated. Consumers are not buying beyond a few weeks.

Toronto, Ont., April 2.—Canadian pig iron markets are showing strength, in prices and demand. The recent advance in Buffalo pig iron has led Canadian producers to consider an increase of 50 cents to $1. The demand on spot account is steadily increasing, but forward buying has slowed down. About 85 per cent of those who place future delivery contracts are covered.

Chicago, April 2.—Northern pig iron is firm at $20, base, Chicago, as shown by sales of 3000 to 5000 tons just closed. A fair volume of late second quarter tonnage is being booked. Some views are that the Chicago price may remain in effect, due to the recent reduction in southern iron, although one southern furnace is said to be withholding quotations for new business in this district. Daily shipments of northern iron set a record in March. First quarter shipments also were heavier than any previous first quarter. No appreciable gains are noted in furnace stocks.

Youngstown, O., April 2.—Sales of No. 2 foundry and malleable pig iron continue in small tonnages. Quotations are firm. No. 2 foundry holds at $18, furnace, as does standard basic, while malleable and bessemer are steady at $18.50, furnace.

Philadelphia, April 2.—Foundry pig iron sales are small, but the volume is fair. Prices are firm at $21, base, furnace, for eastern Pennsylvania foundry iron. Basic shipments are large.



Pig Iron Output a Peak for March

PIG iron production last month broke all records for March. With a daily rate of 119,575 gross tons it exceeded the previous high March, that of 1925, and its daily rate of 115,207 tons by 3.7 per cent. It gained 4.03 per cent over the 114,942 ton average of February and 15.8 per cent over the rate of 103,199 tons in March, 1928.

The March total also was a monthly record. The 3,706,822 tons compared with 3,218,376 tons in February and 3,199,175 tons last March. The first quarter total of 10,358,226 tons is also a new high, comparing with 8,953,358 tons in the first quarter of 1928 and 10,157,696 tons in previous high first quarter of 1925.

MONTHLY PRODUCTION

	1929	1928	1927	1926
Jan.	3,433,028	2,855,515	3,101,346	3,319,789
Feb.	3,218,376	2,898,668	2,940,604	2,923,850
Mar.	3,706,822	3,199,175	3,482,107	3,458,171
Total 3 mos.	10,358,226	8,953,358	9,524,057	9,701,810
April		3,181,975	3,424,377	3,438,805
May		3,292,790	3,391,067	3,477,820
June		3,082,340	3,089,726	3,232,478
July		3,072,711	2,954,625	3,224,663
Aug.		3,136,995	2,950,674	3,200,723
Sept.		3,063,593	2,782,500	3,163,269
Oct.		3,373,539	2,812,015	3,334,206
Nov.		3,304,656	2,661,863	3,237,992
Dec.		3,369,784	2,698,208	3,089,175
Total		37,831,741	36,289,112	39,100,941

Rate of Operation

(Relation of Production to Capacity)

	1929†	1928†	1927*
March	88.0	76.1	79.8
Feb.	84.5	73.6	74.7
Jan.	81.5	67.8	71.2
Dec.	.....	80.2	61.8
Nov.	.....	81.1	63.0
Oct.	.....	79.3	64.5
Sept.	.....	75.2	65.9
Aug.	.....	74.4	67.6

***Based on coke pig iron capacity of 51,379,400 gross tons as of Dec. 31, 1926. †Based on capacity of 49,605,720 tons as of Dec. 31, 1927. Capacities computed by American Iron and Steel institute.**

In March no change occurred in the lineup of merchant stacks. However, nine steelworks stacks were blown in and four were blown out, making a net gain of five stacks in blast as of March 31. On that date 213 stacks were active, the largest number since April, 1927.

March production is classified as 728,948 tons of merchant and 2,977,874 tons of non-merchant iron, and 37,979 tons of ferromanganese and spiegeleisen.

AVERAGE DAILY PRODUCTION

	1929	1928	1927	1926	1925
Jan.	110,742	92,113	100,043	107,039	108,781
Feb.	114,942	99,954	105,021	104,423	114,788
Mar.	119,575	103,199	112,326	111,554	115,207
Apr.		106,066	114,146	114,627	107,041
May		106,219	109,388	112,187	94,642
June		102,745	102,991	107,749	89,301
July		99,120	95,311	104,021	85,976
Aug.		101,193	95,183	103,249	87,328
Sept.		102,120	92,750	105,442	90,862
Oct.		108,824	90,710	107,555	97,351
Nov.		110,155	88,728	107,933	100,775
Dec.		108,702	87,039	99,651	104,808
Ave.	115,091	103,365	99,422	107,126	99,645

DIVISIONS OF PRODUCTION

1928	Merchant	Non-merchant	Spiegel and ferro-manganese
Jan.	649,654	2,205,861	32,510
Feb.	579,298	2,319,370	27,376
Mar.	597,106	2,602,069	34,587
Total 3 mos.	1,826,058	7,127,300	94,473
Apr.	586,045	2,595,930	33,599
May	596,664	2,696,126	38,466
June	589,127	2,493,213	38,628
July	584,611	2,488,100	42,230
Aug.	563,510	2,573,485	33,585
Sept.	580,344	2,483,249	31,170
Oct.	643,043	2,730,496	33,519
Nov.	632,869	2,671,787	38,811
Dec.	686,431	2,683,353	34,541
Total	7,288,702	30,543,039	419,022
1929			
Jan.	744,448	2,688,580	37,210
Feb.	665,648	2,552,748	34,419
Mar.	728,948	2,977,874	37,979
Total 3 mos.	2,139,044	8,219,202	109,608

At the rate pig iron was being produced in March, the year's production would total 43,650,000 tons, compared with the actual yearly record of 40,025,850 tons in 1923.

Changes in the steelworks blast furnace lineup in March were as follows: Bethlehem Steel Co. blew in three stacks; Tennessee Coal, Iron & Railroad Co. blew in two and blew out two; Carnegie Steel Co. blew in two; National Tube Co. dropped one; Illinois Steel Co. blew in one and blew out one; Youngstown Sheet & Tube Co. blew in one.

The relation of production to capacity in March was 88 per cent, contrasted with 84.5 per cent in February and 76.1 per cent in March 1928.

The Bethlehem Steel Co. has removed its Detroit headquarters, in charge of J. S. Hegeman, from 1917 to the thirty-second floor of the Penobscot building.

MARCH PIG IRON PRODUCTION

	No. in blast last day of month March	Feb.	Total tonnage made Merchant	Nonmerchant	—Totals— March	February
Ohio	46	46	154,070	680,612	834,682	756,268
Pennsylvania	74	71	134,773	1,100,221	1,234,994	1,049,714
Alabama	18	18	128,361	114,571	242,932	221,466
New York	16	15	108,232	137,171	245,403	207,300
Illinois	20	20	135,249	262,337	397,586	339,147
Colorado	3	3				
Indiana	16	16				
Maryland	6	5	3,291	534,746	538,037	445,486
Virginia	1	1				
Wisconsin	0	0				
Kentucky	1	1				
Massachusetts	1	1				
Tennessee	1	1	29,462	73,940	103,402	89,567
Utah	1	1				
West Virginia	3	3				
Michigan	4	4				
Minnesota	2	2				
Missouri	0	0	23,608	48,199	71,807	75,009
New Jersey	0	0				
Texas	0	0				
Spiegel and ferro—all state	....	....	11,902	26,077	37,979	34,419
Total	213	208	728,948	2,977,874	3,706,822	3,218,376

1928 Pig Iron Up 4.35 Per Cent

Total Tonnage Gains but Does Not Reach 1926 Record, According to Figures of American Iron and Steel Institute

PRODUCTION of pig iron and ferroalloys in the United States in 1928 totaled 38,155,714 gross tons, according to official figures just announced by the American Iron and Steel institute. This total was 1,590,069 tons, or 4.35 per cent greater than the 36,565,645 tons made in 1927, and was the highest yearly production but three. The record tonnage was 30,361,146 tons in 1923, with 39,434,797 tons in 1916 second. Third place was taken by 1926 with 39,372,729 tons.

Of this total 37,401,648 tons was pig iron and 754,066 was ferroalloys. In 1927 the corresponding figures were 35,858,232 tons and 707,413 tons, respectively. Pig iron gained 4.30 per cent and ferroalloys 6.59 per cent. Detail of tonnages by grades and changes by percentage are given in the accompanying table.

Of the total production of pig iron Pennsylvania made 12,052,405 tons, or 32.22 per cent, a gain of 5.11 per cent over 1927; Ohio, 9,017,025, a gain of 7.25 per cent; Indiana and Michigan, 4,583,065, a gain of 9.13 per cent; Illinois, 3,942,412, a gain of 9.86 per cent; Alabama, 2,517,485, a decline of 8.73 per cent. Declines were made in Massachusetts-New York, Colorado-Utah, Wisconsin-Minnesota and Tennessee areas.

Of the total production of pig iron and ferroalloys 8,303,969 tons were made for sale and 29,851,745 tons for the makers' use. This represents a proportion of 21 per cent merchant and 79 per cent nonmerchant. The corresponding figures for 1927 were 25.9 per cent merchant and 74.1 per cent nonmerchant.

On the basis of fuel used 37,258,688 tons of the pig iron were made with coke and 142,960 tons by charcoal. None was made by anthracite, the last use of this fuel having been in 1923. The 754,066 tons of ferroalloys were not classified as to fuel used but represents all ferroalloys made in blast furnaces or electric furnaces. Coke pig iron represented 99.6 per cent of the total. The corresponding ratio in 1927 was 99.6 per cent.

Charcoal pig iron, with 142,960 tons in 1928 showed a decrease of 21,609 tons from the 164,569 tons produced in 1927. The institute compilation shows there were 318 blast furnaces in the country Dec. 31 and of this number 193 were in blast. Coke furnaces numbered 309, of which 189 were active.

Comparative use of direct iron over that cast in pigs is shown by the fact that 26,284,316 tons was delivered in a molten condition, the remaining 11,871,398 tons being cast. Machine cast accounts for 10,073,090 tons and sand cast for 1,312,422 tons. Direct castings totaled 28,118 tons and chill cast iron 457,768 tons. Apparently basic iron accounts for most of the tonnage delivered molten, as 18,229,436 tons of that grade was delivered hot and 3,894,974 in cast form.

Four districts have produced most of the mercury of the world for many years, namely, Almaden in Spain, Idria and Monte Amiata in Italy and California in United States.

PRODUCTION OF COLD, HOT, AND WARM BLAST CHARCOAL PIG IRON.

Kinds of pig iron.	1924.	1925.	1926.	1927.	1928.
Cold blast	.....	1,014	400	.....	.....
Hot and warm blast	212,710	195,150	163,480	164,569	142,960
Total.....Gross tons	212,710	196,164	163,880	164,569	142,960

PRODUCTION OF PIG IRON BY GRADES AND FERRO-ALLOYS BY KINDS, 1927–1928, SHOWING INCREASE OR DECREASE.

Grades of pig iron and kinds of ferro-alloys	1928.	Per cent.	1927.	Per cent.	Increase.	Per cent.
Pig iron:						
Basic	22,124,410	59.15	19,357,064	53.98	2,767,346	14.30
Bessemer and low-phos.	9,013,847	24.10	9,105,915	25.40	*92,068	* 1.01
Foundry	4,209,790	11.26	5,504,419	15.35	*1,294,629	*23.52
Malleable	1,922,970	5.14	1,699,583	4.74	223,387	13.14
Forge	88,362	.24	144,532	.40	*56,170	*38.86
All other pig iron	42,269	.11	46,719	.13	*4,450	*9.53
Total pig iron	37,401,648	100.00	35,858,232	100.00	1,543,416	4.30
Ferro-alloys:						
Ferro-manganese, Spiegeleisen	419,213	55.59	394,346	55.74	24,867	6.31
Ferro-silicon	303,595	40.26	278,277	39.34	25,318	9.10
All other ferro-alloys	31,258	4.15	34,790	4.92	*3,532	*10.15
Total ferro-alloys	754,066	100.00	707,413	100.00	46,653	6.59
Grand total	38,155,714	.....	36,565,645	.....	1,590,069	4.35

* Decrease.

PIG IRON AND FERRO-ALLOYS MADE FOR SALE OR FOR USE OF MAKERS IN 1928.

Pig iron and ferro-alloys.	For sale.	For maker's use.	Total. Gross tons.
Pig iron:			
Basic	1,747,702	20,376,708	22,124,410
Bessemer and low-phosphorus	409,866	8,603,981	9,013,847
Foundry	3,808,988	400,802	4,209,790
Malleable	1,700,178	222,792	1,922,970
Forge or mill	51,029	37,333	88,362
White and mottled, direct castings, etc.	5,913	36,356	42,269
Total pig iron.....Gross tons.	7,723,676	29,677,972	37,401,648
Ferro-alloys:			
Ferro-manganese and spiegeleisen	245,440	173,773	419,213
Ferro-silicon	303,595	0	303,595
All other ferro-alloys	31,258	0	31,258
Total ferro-alloys.....Gross tons.	580,293	173,773	754,066
Total pig iron and ferro-alloys G. T.	8,303,969	29,851,745	38,155,714

Exports Lose as Imports Gain

Decline in February Shipments Due Mainly to Short Month, Combined With 29,201-Ton Loss in Scrap—Average Daily Movement Increases As Does That of Receipts—Canada Is Principal Export Market

DAILY average movement of iron and steel exports from the United States in February improved distinctly over January, but because of the short month and a striking drop in trade of scrap, the month's total shipments declined 14,585 tons. Exports in February were 259,711 tons, compared with 274,296 tons in January and 185,907 tons in February, 1928, according to statistics of the iron and steel division of the department of commerce, Washington.

IMPORTS AND EXPORTS

Gross Tons

	—1929—		—1928—	
	Imports	Exports	Imports	Exports
Jan.	54,793	274,296	58,635	205,766
Feb.	58,146	259,711	48,756	185,907
2 mos.	112,939	534,007	107,626	391,587
March			74,128	221,935
April			71,579	215,184
May			72,106	267,890
June			65,819	262,052
July			47,830	253,336
Aug.			69,914	287,297
Sept.			57,782	228,056
Oct.			63,880	256,870
Nov.			67,103	256,886
Dec.			55,199	221,810
Total			782,694	2,862,997

A slight increase was noted in imports, which totaled 58,146 tons in February, compared with 54,793 tons in January and 48,756 tons in February, 1928. Daily movement of receipts also gained over January.

Gains in exports were registered in 24 classes of products, while only 18 showed losses. The largest increases were made in black steel sheets, plain structural shapes, casing and oil line pipe and welded pipe. Against these gains was the decline of 29,201 tons in scrap. Steel bars and car wheels and axles also lost more heavily than the other classes.

In imports, 15 classes of products reflected gains while 10 showed losses. The only gains in excess of 1000 tons were in "other" pipe and in scrap, while ferromanganese registered the only loss exceeding 1000 tons.

The principal product exported in February was tin plate, totaling 26,687 tons, going mostly to Japan, China, Argentina and Canada. Scrap exports were large, even in face of the loss, with Canada and Italy the leading markets. The Philippine islands in addition to Canada were receivers of large quantities of galvanized sheets. Black steel sheets exports totaled 18,649 tons and Canada and France received the greater part of this tonnage. Plates totaling 16,298 tons and rails totaling 16,149 tons were important exports.

Leading as the principal market for iron and steel exports from the United States was Canada, as usual. Japan continued in second place, while Argentina was third. Venezuela and Italy were other important markets.

Principal classes of imports in February were pig iron, totaling 16,299

ORIGIN OF PIG IRON IMPORTS

Gross Tons

From:	Feb.	Jan.
Belgium	33	151
Germany	50	3
Netherlands	4,349	3,091
Norway	50	51
Sweden	177	50
United Kingdom	4,540	5,250
Canada	95	164
British India	6,974	7,315
Mexico	31	33
Totals	16,299	16,108

ORIGIN OF IRON ORE IMPORTS

Gross Tons

From:	Feb.	Jan.
Spain	6,960	11,388
Canada	24	122
Cuba	64,000	39,000
Chile	152,791	83,451
Algeria and Tunis	5,580	25,100
Sweden	7,080	6,648
Australia	4,499	5,160
Germany	.....	545
British India	.....	1,494
Egypt	.....	7,400
Totals	240,934	180,308

ORIGIN OF MANGANESE IMPORTS

Gross Tons

From:	Feb.	Jan.
Soviet Russia in Europe	9,122	.....
Brazil	7,406	13,763
Egypt	58	.....
British India	4,124	1,560
Germany	.....	9
Greece	.....	12
Totals	20,710	15,344

ORIGIN OF FERROMANGANESE IMPORTS

(Concentrates)

Gross Tons

From:	Feb.	Jan.
France	71	.....
Norway	719	2,204
United Kingdom	428	855
Canada	1,967	2,312
Italy	140	131
Totals	3,325	5,502

ORIGIN OF IMPORTS

Gross Tons

From:	Steel bars	Cast iron pipe	Steel scrap	Ingots, blooms, etc.
Belgium	1,017	119	19	834
France	649	3,351	68	922
Germany	238	103	.....	18
Sweden	717	.....	44	57
United Kingdom	74	75	18	5
Canada	30	.....	7,907	5
Czechoslovakia	24	.....	.....	.....
Norway	2	.....	6	.....
Barbados	.....	.....	140	.....
Cuba	.....	.....	179	.....
Dominican Republic	.....	.....	125	.....
Italy	.....	.....	18	.....
Totals	2,751	3,648	8,524	1,841

IMPORTS OF IRON AND STEEL

Gross Tons

	Feb. 1929	Jan. 1929	January through 1929	Feb. 1928
Pig iron	16,299	16,108	32,407	17,514
Ferromanganese and alloys (1)	3,325	5,502	8,827	6,209
Ferrosilicon (2)	794	446	1,240	698
Ferrochrome (3)	15	28	43	138
Scrap	8,524	7,207	15,731	6,693
Steel ingots, blooms, billets, etc.	1,841	1,717	3,558	2,354
Steel bars	2,751	3,134	5,885	16,692
Iron bars	335	239	574	433
Wire rods	595	1,183	1,778	3,264
Hoops, bands, and scrolls	1,536	1,182	2,718	4,604
Boiler and other plate	982	73	1,055	72
Sheets, skelp and sawplate	923	827	1,750	5,782
Tin plate	17	41	58	45
Structural shapes	9,017	9,470	18,487	24,686
Rails and splice bars	743	71	814	3,331
Cast iron pipe	3,648	2,760	6,408	6,996
Other pipe and tubes	4,807	2,659	7,466	4,442
Barbed wire	349	285	634	586
Round iron and steel wire	540	602	1,142	585
Steel telegraph and telephone wire	....	....	....	36
Flat wire and strip steel	167	149	316	348
Wire rope and strand	153	133	286	268
Other wire	38	41	79	94
Nails, tacks, and staples	558	708	1,266	937
Bolts, nuts, rivets, and washers	23	18	41	56
Castings and forgings	166	210	376	763
Total	58,146	54,793	112,939	107,626

(1) Manganese content.
(2) Silicon content.
(3) Chromium content.

IMPORTS BY COUNTRIES OF ORIGIN

Gross Tons

	Feb. 1929	January through February 1929	January through February 1928
Austria	4	61	64
Belgium	7,502	16,841	32,378
Czechoslovakia	25	670	155
France	8,866	14,659	15,838
Germany	7,555	13,733	16,987
Italy	158	311	10
Netherlands	4,520	7,831	4,719
Norway	1,233	3,526	1,230
Soviet Russia	1	1	.....
Sweden	2,165	4,457	3,125
United Kingdom	7,787	15,258	10,097
Canada	10,827	21,738	8,214
Mexico	84	117	90
Barbados	140	140	.....
Cuba	179	179	.....
Dominican Republic	125	125	.....
British India	6,974	14,289	9,428
Japan	1	1	28
Switzerland	.....	1	1
China	.....	1	.....
Other Countries	.....	.....	3,899
Totals	58,146	112,939	107,626

tons; structural shapes, 9017 tons; scrap, 8524 tons, and "other" pipe, 4807 tons. For the second consecutive month, Canada was the principal source for iron and steel imports into the United States, sending in February 10,827 tons. France was next, with shipments of 8866 tons to the United States, followed by the United Kingdom with 7787 tons. Belgium and Germany were also important shipping sources.

Of the scrap total imported by the United States, Canada sent 7907 tons. The greatest tonnage of steel bars shipped originated in Belgium. Cast iron pipe shipments from France were 3351 tons out of the total of 3648 tons.

EXPORTS OF IRON AND STEEL

Gross Tons

	Feb. 1929	Jan. 1929	January through Feb. 1929	January through Feb. 1928
Pig iron, not including ferro-alloys	4,118	3,769	7,887	7,897
Ferromanganese and spiegeleisen	42	168	210	2,070
Scrap	21,552	50,753	72,305	59,418
Ingots, blooms, etc.	775	1,901	2,676	2,144
Skelp, iron and steel	4,249	2,819	7,068	11,398
Iron bars	337	1,311	1,648	570
Steel bars	17,390	22,406	39,796	18,561
Alloy steel bars	3,102	1,785	4,887	1,538
Wire rods	3,539	4,411	7,950	5,315
Plates	18,965	17,385	36,350	21,204
Galvanized sheets	17,669	16,423	34,092	22,395
Black steel sheets	18,649	13,465	32,114	30,843
Black iron sheets	1,175	1,003	2,178	2,105
Hoops, bands and strip steel	6,740	6,891	13,631	7,105
Tin plate, terne plate, etc.	26,687	26,387	53,074	37,797
Structural shapes, plain material	21,533	17,259	38,792	23,218
Structural shapes, fabricated	14,690	10,742	25,432	10,816
Metal lath	560	574	1,134	651
Steel rails	16,149	17,883	34,032	38,143
Rail fastenings, switches, frogs, etc.	2,785	2,627	5,412	12,882
Boiler tubes	1,818	1,524	3,342	2,758
Casing and oil line pipe	18,991	16,330	35,321	14,965
Black and galvanized welded pipe	12,096	10,344	22,440	18,704
Malleable iron screwed pipe fittings	1,093	1,135	2,228	1,206
Cast iron screwed pipe fittings	780	722	1,502	865
Cast iron pressure pipe and fittings	974	513	1,487	2,528
Cast iron soil pipe and fittings	666	1,022	1,688	1,874
Plain wire	5,498	3,845	9,343	6,972
Barbed wire and woven wire fencing	5,642	6,529	12,171	9,954
Wire cloth and screening	201	152	353	299
Wire rope	724	620	1,344	1,037
Insulated wire and cable	66	163	229	87
Other wire and manufactures of	1,099	926	2,025	1,361
Wire nails	1,589	1,498	3,087	2,512
Nails other than wire	671	836	1,507	1,284
Tacks	44	58	102	137
Horseshoes	26	21	47	74
Bolts, nuts, rivets, except track	1,279	1,411	2,690	1,811
Car wheels and axles	1,579	2,818	4,397	2,348
Iron castings	1,270	1,181	2,451	2,271
Steel castings	1,339	1,444	2,783	1603
Forgings	1,560	1,242	2,802	867
Total	259,711	274,296	534,007	391,587

DESTINATION OF FEBRUARY IRON AND STEEL EXPORTS

Gross Tons

	Rails	Galvanized sheets	Plates not fabricated	Tin, terne plate	Steel sheets black	Barbed wire	Steel bars	Steel scrap
Argentina	.....	334	5	2,756	596	1,503	.....	.....
Australia	.....	33	123	.....	153	.....	.....	.....
Belgium	.....	.....	.....	.....	.....	.....	.....	126
Brazil	2,076	1,631	.....	551	.....	1,061	133	.....
British India	.....	1,527	.....	1,946	.....	.....	.....	.....
British Malaya	.....	.....	.....	511	.....	.....	.....	.....
British S. Africa	.....	40	.....	.....	.....	41	.....	.....
Canada	1,809	3,489	14,216	2,470	8,914	1,185	10,063	7,542
Central America	1,445	437	158	.....	10	18	222	.....
Chile	4	19	210	128	464	.....	365	.....
China	1,251	280	.....	3,777	.....	.....	334	873
Colombia	188	960	72	128	.....	451	357	.....
Cuba	387	484	478	278	217	255	363	.....
Dutch E. Indies	.....	813	.....	.....	.....	.....	.....	.....
Egypt	.....	.....	.....	624	.....	.....	.....	.....
Europe	.....	.....	5	.....	60	.....	76	.....
Other Europe	.....	274	.....	251	.....	.....	.....	.....
France	.....	.....	.....	.....	4,044	.....	.....	.....
Hong Kong	.....	.....	.....	753	.....	.....	.....	.....
Italy	.....	.....	.....	809	1,417	.....	.....	6,126
Japan	1,436	707	.....	7,435	1,230	.....	1,379	4,024
Java and Madura	.....	876	.....	.....	.....	.....	.....	.....
Kwantung	2,274	.....	.....	.....	.....	.....	.....	850
Mexico	963	934	78	582	160	665	78	152
Norway	.....	63	.....	.....	.....	.....	.....	.....
Peru	38	.....	165	44	82	.....	1,043	.....
Philippine Islands	376	2,980	.....	591	521	135	668	.....
Poland	.....	.....	.....	.....	.....	.....	.....	1,800
Soviet Russia	.....	.....	.....	855	.....	.....	.....	.....
United Kingdom	.....	.....	.....	.....	85	.....	1,733	26
Uruguay	.....	.....	.....	898	.....	.....	.....	.....
Venezuela	100	.....	.....	8	.....	.....	.....	.....
	16,149	17,669	16,298	26,687	18,649	5,127	17,390	21,552

DESTINATION OF EXPORTS

Gross Tons

	Feb. 1929	January through Feb. 1929	January through Feb. 1928
N. and Cent. America,			
West Indies	124,051	244,187	171,772
Canada and Newfoundland	99,429	189,882	137,771
Cuba	5,857	12,745	10,436
Guatemala	483	1,011	3,917
Honduras	1,908	2,800	643
Panama	2,994	5,233	3,029
Salvador	334	2,023	512
British W. Indies	2,242	7,498	1,019
Other W. Indies	2,569	6,189	3,457
Other Cent. America	8,215	16,806	11,988
South America	47,015	92,275	64,439
Argentina	13,366	25,626	15,458
Brazil	8,027	13,454	10,790
Chile	3,768	9,446	12,260
Colombia	5,690	9,377	10,742
Peru	4,751	8,587	4,174
Uruguay	2,252	3,490	958
Venezuela	8,814	21,498	9,276
Other S. America	347	797	781
Europe	22,781	59,126	25,257
Belgium	166	226	3,083
France	4,388	5,632	482
Greece	58	123	72
Italy	8,647	23,446	1,683
Netherlands	325	416	632
Roumania	230	477	602
Sov. Rus. in Europe	927	997	1,193
United Kingdom	4,237	9,772	9,226
Other Europe	3,803	18,037	8,284
Far East	64,109	134,732	127,504
British Malaya	1,646	2,730	1,070
China	9,163	18,073	23,506
Dutch East Indies	10,153	18,302	4,063
India and Ceylon	4,893	6,178	6,128
Japan and Chosen	22,293	59,808	72,540
Kwantung	4,494	5,062	1,526
Philippine Islands	6,357	15,469	14,616
Australia	2,476	4,327	3,182
New Zealand	202	970	442
Other Asia and Far Eastern markets	2,433	3,813	431
Africa	1,755	3,687	2,615
British S. Africa (Union of)	612	746	1,541
Egypt	688	2,434	734
Mozambique	128	150	170
Other Africa	327	357	170

Negroes who want jobs in two of Milwaukee's largest foundries must have the approval of the Milwaukee Urban league, a negro welfare organization, which means that they must be good workmen and steady on the job, it is announced.

Exports of Metalworking Machinery

(In number except where otherwise specified)

	February 1929	February 1928	January through February 1929	January through February 1928
Engine lathes	72	68	144	135
Turret lathes	38	30	84	56
Other lathes	70	53	133	109
Vertical boring mills and chucking machines	55	7	91	14
Thread-cutting and automatic screw machines	63	66	170	140
Knee and column type milling machines	33	24	74	54
Other milling machines	65	51	130	132
Gear-cutting machines	44	24	77	55
Vertical drilling machines	39	19	75	60
Radial drilling machines	8	13	18	31
Other drilling machines	82	56	369	99
Planers and shapers	49	36	100	76
Surface grinding machines	7	....	7	....
External cylindrical grinding machines	77	94	220	169
Internal grinding machines	40	35	85	79
Tool grinding, cutter grinding, and universal grinding machines	3049	41	3134	90
Pneumatic portable tools	2015	1498	3832	3075
Chucks for machine tools	1347	1578	3779	1895

Industrial Men in the Day's News

Robert W. Gillispie, New President, Galion Iron Works & Mfg. Co.

HIS business career in iron and steel dating back a quarter century is established on a triparte foundation—manufacture, sale and use.

EXPERIENCE gained at Steelton, Pa., New York, Philadelphia and Bethlehem, Pa., stood him in good stead at Columbus, O., and now at Galion, O., will likewise prove of aid.

THOROUGHNESS and fixity of purpose are two of his outstanding characteristics and they furnish the basis for his success and that of his company.

THREE-fold is the foundation upon which is built the business success of Robert W. Gillispie, vice president and general manager of the Jeffrey Mfg. Co., Columbus, O., who, as noted in IRON TRADE REVIEW of Feb. 14, was elected president of a subsidiary company, the Galion Iron Works & Mfg. Co., Galion, O. He has rounded out an industrial career dating back a quarter century and in so doing has run the entire gamut of manufacture, sale and use of iron and steel.

He saw the molten pig iron flow and the pigs formed as he served his apprenticeship in the blast furnace department of the Pennsylvania Steel Co. at Steelton, Pa. Later he saw the pig iron made into steel and utilized in numerous ways while working in practically all of that company's manufacturing departments. He then gained considerable experience in the sale of those commodities at its New York sales office where, in 1912, he was promoted to be district sales manager.

That his selling efforts were highly successful is shown by the fact that they were recognized in his being made general manager of sales of the Pennsylvania and Maryland Steel companies, Philadelphia, three years later or in 1915. When these companies were acquired by the Bethlehem Steel Co. in 1916, Mr. Gillispie was removed to Bethlehem, Pa., and placed in charge of commercial sales. He continued with Bethlehem as an executive of the general sales department until July 1, 1926. That date marks the transfer of his sphere of activity to Columbus, O., when he became vice president, director and general manager of the Jeffrey company.

There he saw the steel with which he had become so familiar, utilized in the building of large units of coal mining machinery, electric locomotives, chains, conveying and crushing equipment. This experience was broadened when the Jeffrey company acquired the Galion Iron Works & Mfg. Co., Galion, O., which makes cast iron and galvanized corrugated culverts and produces a comprehensive line of road building machinery. It maintains branches at Pittsburgh and Harrisburg, Pa., Birmingham, Ala., Nashville, Tenn., Roanoke, Va. Columbia S. C., Greensboro, N. C., Kansas City, Mo., and Orlando, Fla.

Mr. Gillispie was born near Oyster Bay on Long Island, N. Y. He attended grammar school in New York and was graduated from the boys' high school in Brooklyn in 1900. In 1904 he was graduated from Wesleyan university, Middletown, Conn. While at college he was active in athletics and was made captain of the football team. He was a member of the Psi Upsilon and Mystical Seven fraternities and likewise was elected to the honorary scholastic fraternity Phi Beta Kappa. His early interest in athletics has not diminshed and his continued active participation in sports of all kinds has furnished him with a splendid physical development which has enabled him to carry to successful conclusions, enterprises in which he is interested.

He is a director of other subsidiary companies of the Jeffrey company, including the Ohio Malleable Iron Co., Columbus, O.; British Jeffrey-Diamond Ltd., and British Spiro Turbine Ltd., Wakefield, England; and he is president and director of the Jeffrey Mfg. Co. Ltd., Montreal, Que. He likewise serves on the board of directors of Inland Investors Inc., Cleveland.

Thoroughness is one of his chief faculties. Business decisions are made from sound judgment based on all obtainable facts. He is not easily deflected from the

straight approach to his objectives. Having charted a course, he knows how best he can pursue it to the desired harbor. These attributes go far toward explaining the pyramiding of his success in life—he has built his career carefully and on a solid foundation.

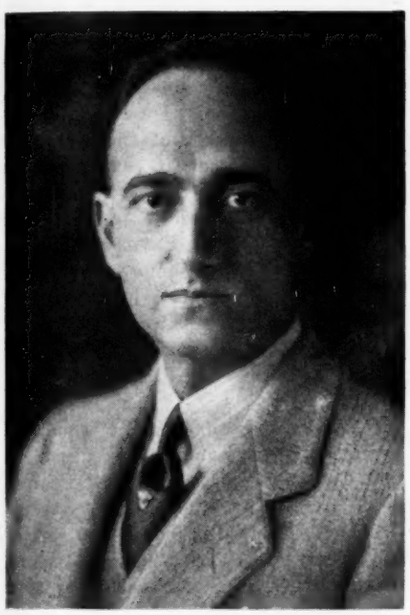
One of his intimate associates says: "Mr. Gillispie's success can be attributed to many personal characteristics but perhaps the outstanding ones may be listed as follows: His forceful and friendly personal magnetism and enthusiasm inspires loyalty and admiration among his associates and willingness to trust his judgment. Undoubtedly much of his success may be attributed to this ability.

Men of the Industry

B. H. WITHERSPOON and A. R. Ellis have been elected president and vice president in charge of operations, respectively, of the Pittsburgh Testing Laboratory, Pittsburgh, inspecting engineer and chemist.

Mr. Witherspoon formerly was district manager of the Remington Rand Business Service Inc. in Los Angeles, Calif.

Mr. Ellis has been affiliated with



B. H. WITHERSPOON

the Pittsburgh Testing Laboratory since 1910, and has been general manager and director since 1921. He is a graduate engineer of Cornell university, Ithaca, N. Y.

* * *

Henry C. DuBois, vice president, E. J. Lavino & Co., Philadelphia, has returned from a trip to Cuba.

* * *

John R. Winter resigned recently as general superintendent of the Youngstown Pressed Steel Co., Warren, O.

* * *

Robert P. Lamont, United States secretary of commerce, former president of the American Steel Foundries and the General Steel Castings Corp., has resigned as a director of the Illinois Bell Telephone Co., Chicago, as well as from other directorates and official posts in industrial concerns to a number exceeding 30.

* * *

Robert K. Plummer, 419 Commerce building, Milwaukee, has been made district sales representative for Gears & Forgings Inc., Cleveland.

* * *

H. P. Kreulen, formerly secretary, treasurer and general manager, Spring City Foundry Co., Waukesha, Wis., has been elected vice president and treasurer. Arthur L. Grede has been elected secretary.

* * *

Frank H. Filley, president of the American Mfg. Co., Brooklyn, selling agent in the United States for cotton ties manufactured by subsidiaries of the United States Steel Corp., is in Europe.

* * *

Robert T. Wilson of Fownes & Orr Inc., investment company, Pittsburgh, has been elected a director of the Witherow Steel Corp., Pittsburgh. The number of directors was increased from six to seven to permit his election.

* * *

A. Morris Thompson has been elected vice president in charge of engineering of the Dardelet Threadlock Corp., 120 Broadway, New York, with laboratories at Harrison, N. J. W. W. Colpitts of Coverdale & Colpitts, 52 Wall street, New York, has been elected a director of the Dardelet corporation.

* * *

Conrad G. High, for the past 10 years associated with the Penn Planing Mill Co., has been appointed to the Reading, Pa., district sales staff of the Reading Iron Co.

A. C. Knight, formerly with the Oversole Rubber Corp., New York, has been added to the company's New York office selling organization.

* * *

Kieth Wood, branch manager at Berlin for the General Motors Export Co., has been transferred to Ruesselsheim, Germany, to become liaison officer of the General Motors Export Co. at its newly acquired Opel plant. He is succeeded in Berlin by A. G. Welland, formerly of the General Motors export branch at London.

* * *

George H. Houston, associated with the Fisher Brothers of Detroit in their many industrial enterprises, was

A. R. ELLIS

elected president of the Baldwin Locomotive Works, Philadelphia, March 28. He succeeds Samuel M. Vauclain, the outstanding figure in the company for many years, who was elected chairman of the board.

Thomas S. Gates, member of the firm of Drexel & Co., Philadelphia, and of Morgan & Co., New York, who was chairman of the board, will continue as chairman of the executive committee.

* * *

Charles Seelbach, president of the Forest City-Walworth Run Foundries Co., Cleveland, has been elected treasurer of the Ohio Foundries Association Inc., to succeed E. Sands, who

resigned as treasurer and director. W. W. Sherman, Electric Auto-Lite Co., Fostoria, O., has been elected a director of the Ohio Foundries Association Inc.

* * *

R. R. Fauntleroy, president, Moline Malleable Iron Co., St. Charles, Ill., has been chosen president of the Malleable Iron Research institute, to succeed the late Frederick L. Sivyer. Mr. Fauntleroy served a number of years ago as president of the American Malleable Castings association, which was succeeded by the Malleable Iron Research institute.

* * *

David D. Lupton, former senior vice president of David Lupton's Sons Co., Philadelphia, was unanimously elected president by the board of directors March 11. He succeeds Edward Lupton, who died Feb. 21.

* * *

J. C. Lincoln, formerly president of the Lincoln Electric Co., Cleveland, has been made a chairman of the board of directors. J. F. Lincoln, formerly vice president, has been made president. J. C. Lincoln devotes a large portion of his time to electrical research and experimental work.

* * *

Russell H. Sankey was appointed sales manager in charge of body sales work for the Baker-Raulang Co., Cleveland. Prior to his joining the staff of the Baker-Raulang Co., Mr. Sankey was for six years sales manager of the Philips Custom Body Co. of Warren, O.

* * *

Paul E. McKinney has resigned as chemist and metallurgist at the government's naval gun factory at Washington, and has been appointed metallurgical engineer by the Bethlehem Steel Co., Bethlehem, Pa. He had charge of the naval gun plant's foundry for several years.

* * *

D. A. Griffith, formerly associated with B. Nicoll & Co., 249 Madison avenue, New York, has been appointed vice president of Herbert Kennedy & Co., 475 Fifth avenue, that city, in charge of sales. Herbert Kennedy & Co. are American representatives of Societe Anonyme Des Hauts Fourneaux, the Pont-a-Mousson cast pipe interests, of France.

* * *

Lawrence W. Cross, since April 1, 1926, a sales representative at Detroit for the Empire Steel Co., Cleveland, and later for the Empire Steel Corp., Mansfield, O., its successor, resigned April 1 to become affiliated with the Great Lakes Steel Corp., Detroit. Prior to his connection with the Empire company Mr. Cross was steel buyer for the Fisher Body Corp., Detroit.

* * *

H. L. Dickerson, formerly with the utilities division of Henry L. Doherty Co., New York, has been appointed assistant general manager of the United Gas Engineering Co., Houston, Tex. The latter company is the construction subsidiary of the United Gas Co., owner and operator of extensive gas properties in the southwest.

* * *

Robert C. Good has been appointed metallurgical engineer of the Electro Metallurgical Sales Corp., 30 East Forty-second street, New York, to succeed R. S. Poister. His headquarters

ROBERT C. GOOD

will be room 816, Oliver building, Pittsburgh.

* * *

J. A. Clauss, who, as noted in IRON TRADE REVIEW of March 28, has been made chief engineer of the Great Lakes Steel Corp., Detroit, has discharged similar duties for three years with the Trumbull Steel Co., Warren, O., latterly the Republic Iron & Steel Co. Prior to becoming affiliated with the Trumbull company, he was with the Republic company at Youngstown, O., the William Tod Co., Corrigan-McKinney Co., Carnegie Steel Co. (Ohio works), and Lackawanna Steel Co. He is a member of the American Society of Mechanical Engineers, being chairman of the membership committee of the Youngstown chapter.

W. F. Rese, who April 1 became electrical engineer for the Great Lakes corporation, was for 14 years electrical engineer for the Republic and Trumbull companies. Prior to going with Trumbull he was employed in a similar capacity by the Weirton Steel Co.

S. C. Cozad, new field engineer for the Great Lakes interests was similarly engaged for 13 years for the Republic and Trumbull companies. He is a graduate of Ohio State university and prior to becoming affiliated with the Trumbull company was field engineer at the Lowellville, O., plant of the Youngstown Iron & Steel Co. He also was connected with the civil engineering departments of the Pittsburgh Crucible Steel Co., Midland, Pa., and the Allegheny Steel Co., Brackenridge, Pa.

R. M. Hughes, formerly of the engineering department of the Trumbull company, now the Warren, O., works of the Republic company, became chief draftsman for the Great Lakes corporation April 1. Prior to his Trumbull connection he was in the drafting departments of the Republic company, Koppers Co., Pittsburgh, American Smelting & Refining Co., William B. Pollock Co., and Youngstown Sheet & Tube Co.

* * *

Russell B. Koontz, formerly secretary and treasurer of the Adamson Machine Co., Akron, O., was elected president, to succeed the late Alexander Adamson, whose death was noted in IRON TRADE REVIEW March 7.

W. E. Slabaugh, senior member of the law firm of Slabaugh, Seiberling, Huber & Guinther, Akron, was elected to fill the vacancy on the board of directors caused by Mr. Adamson's death.

C. F. Adamson, son of the late executive, was named vice president and Carl L. Fenn was named to succeed Mr. Koontz as secretary-treasurer. L. S. Dudley, trust officer of the First Trust & Savings bank, Akron, becomes assistant secretary and treasurer. The company was established in 1893.

* * *

B. F. Shepherd, for 18 years identified with the Ingersoll-Rand Co., Phillipsburgh, N. J., was recently appointed metallurgist. He was born in that city in 1893 and entered the company's employ after his high school graduation, becoming identified with the heat treating department and aiding greatly in building up the laboratory. About eight years ago the two departments were combined. Mr. Shepherd has served two years as secretary and a similar term as president of the Lehigh Valley chapter of the American Society for Steel Treating.

E. E. Martin, for 34 years with the engineering department of Bagley &

Sewell Co., Watertown, N. Y., was recently appointed chief engineer with general supervision over the entire engineering department.

* * *

Fred W. Linaker, vice president of the Vulcan Soot Cleaner Co., Du Bois, Pa., was recently placed in charge of offices, established at 120 Liberty street, New York. He will be assisted by C. H. Baker.

* * *

M. B. Buschman has resigned as vice president of the Tidewater Structural Materials Corp., 271 Madison avenue, New York, effective May 1. He was one of the organizers of the company in 1927.

* * *

I. E. Walton, formerly assistant sales manager of the Heppenstall Forge & Knife Co., Pittsburgh, was promoted on April 1 to be purchasing agent. He has been in the company's employ the past 12 years.

* * *

B. W. Winship, who has been superintendent of the coke ovens of the Steelton, Pa., plant of the Bethlehem Steel Co., has been appointed to similar duties at the company's Lackawanna plant, effective April 1. Charles Thornton succeeds Mr. Winship at Steelton.

* * *

David Thompson, works superintendent for the American Rolling Mill Co. at Butler, Pa., will join the Great Lakes Steel Corp., at Detroit, as general works manager instead of as assistant chief engineer, as noted in the March 28 issue of IRON TRADE REVIEW.

* * *

Fred L. Lawrence, with the metallurgical department of the Pittsburgh Crucible Steel Co., Pittsburgh, has been appointed resident metallurgist in the company's Detroit office, General Motors building. Mr. Lawrence has been connected with the Pittsburgh company's metallurgical department for the past five years. The position at Detroit is a newly created one.

* * *

Coleman J. Ross, who recently retired as general superintendent of the Buick Motor Co., Flint, Mich., has been with the company since 1904. He is succeeded by L. S. Kurtz, superintendent of the final assembly plant. Mr. Kurtz is succeeded by his former assistant, L. M. Taylor. W. J. Browne, who resigned as assistant general superintendent, has been with the company for 10 years. No successor has been named.

Obituaries

GEORGE H. FLINN, 54, president of Booth & Flinn Co., Pittsburgh, engineer and contractor, died March 29 in that city. He formerly was secretary and treasurer of Booth & Flinn Ltd. and later chairman of the company.

* * *

Frank Carson, 58, an inventor of heating equipment, died recently in Hammond, Ind.

* * *

William G. Harris Jr., 45, vice president of Canada Metals Co. Ltd., Toronto, Ont., died March 28.

* * *

Frederick Leslie Dudley, 71, for many years chief engineer of the American Bridge Co. plant at Ambridge, Pa., died March 27.

* * *

Albert Pankow, pioneer foundryman of Sioux Falls, S. Dak., died recently at Long Beach, Calif. He was one of three brothers who started a foundry in Sioux Falls in 1884 and had lived there 44 years. He was 69 years old.

* * *

Frank Blair Filley, 80, president of the Mound City Oil & Supply Co. and a son of the late Giles F. Filley, pioneer stove manufacturer and president of the Charter Oak Stove Co., died at St. Louis, March 28.

* * *

Cecil W. Sanders, 61, at one time London, England, representative for the Lackawanna Steel Co., Buffalo, and more recently serving in the same capacity for the Gulf States Steel Co., Birmingham, Ala., died at his home in London, March 26.

* * *

Vincent Ferguson, 79, retired, manager of 27 coal mines in the Hocking valley during the strike in 1884, died at Columbus, O. He was manager of the United States Cast Iron Pipe & Foundry Co., Birmingham, Ala., for 20 years.

* * *

Thomas Cooper Hawkins, 69, president of the Western Drop Forge Co., Marion, Ind., which he founded in 1905, died at his home in that city, March 19, after an extended illness.

* * *

G. Frank Hathaway, 49, works manager of the Wyman-Gordon Co., Worcester, Mass., died at his home in West Boylston, Mass. Mr. Hathaway, who was born in the South, entered the employ of the company in 1898, but left in 1912 to become associated with the Park Drop Forge Co., Cleveland. After three years, he resumed his Worcester company connection as superintendent.

* * *

Wolfe Hertz Oltarsh, 73, pioneer in use of steel for building construction, died at his home in New York.

* * *

Charles D. Fuller, 64, superintendent of the open-hearth department and chief chemist at the Latrobe, Pa., works of the Railway Steel Spring Co., died March 20. He was a graduate of Lafayette college in 1888, and was employed by the Latrobe Steel Co. prior to its acquisition by the Railway Steel Spring Co.

* * *

George Allaire Howe, 72, a director of the Colonial Steel Co., Pittsburgh, died March 26 in Bermuda. Mr. Howe, a resident of Pittsburgh was admitted to the bar in 1882. He practiced law until 1888 when he became secretary of Howe, Brown Co. Ltd., steel manufacturer. In 1902 he aided in the organization of the Colonial Steel Co., of which he later became vice president, and was a director at his death.

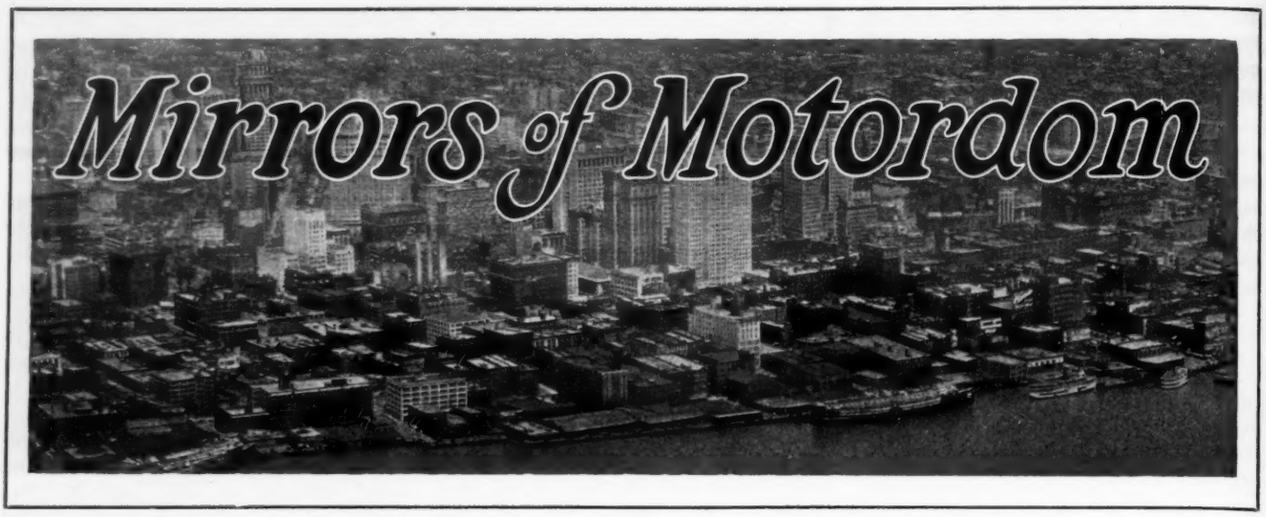
* * *

Arthur R. McArthur, 56, chief mechanical engineer of the Gary, Ind., tin mill plant of the American Sheet & Tin Plate Co., died recently. He formerly was master mechanic of the American company's plant at Ellwood, Ind., and at the Anderson and Gas City, Ind., plants. He went to Gary in 1910 and was active in construction work of the tin mill there as well as the Gary sheet mill plant. He later became chief mechanical engineer of the tin mill.

* * *

Alfred Marshall, 60, former president of the Marshall & Huschart Machinery Co., Chicago, died recently at Mobile, Ala. He was a financier and ornithologist and at the time of his death was engaged in reclaiming deltas of the San Antonio and Guadalupe rivers in Texas. As an assistant to the war trade board, he financed flood protection in 1928.

Mr. Marshall went to Chicago as western manager of the Prentiss Tool & Supply Co., New York. Acquiring the Prentiss company's business in the Middle West, he was one of the organizers of the Marshall & Huschart company and retired as its president. 10 years ago.



Auto Output Still Record but Soft Spots Develop

* * * * * * * * *

Ford and General Motors Carry Contest Overseas

Detroit, April 2

APRIL will be a big month for the automotive industry. Though all indications are to the contrary, it could develop a slight decline from March and still beat out any previous April. No quarter ever has approached that just ended for both the automotive industry and its steel suppliers, and optimism continues rampant, but close observers are analyzing the situation a little more carefully.

January and February, successively, set new high monthly production records, February being the best month in all history. Statistics for March are expected to reveal an increase over February, but the daily rate may prove to have tapered off moderately. Toward the middle of March some weak spots began developing, and these have not been corrected.

This weakness is judged by stocks. Normally, a surplus of cars must be accumulated early in the year against the spring retail selling season, but several years ago there was a concerted drive to keep this within bounds. This year, impelled by general optimism, practically all manufacturers appear to have anticipated retail demand more vigorously and some interests, notably Willys-Overland, Chrysler and Graham-Paige, are reported to have rather generous stocks of new cars.

These producers, as a result, are not now so active in the steel market. On the other hand, some producers have been forging ahead at exceptionally virile rates. Chevrolet, Oakland-Pontiac and Hudson-Essex of the large-scale group and Oldsmobile-Viking of the moderate size group are today's stalwarts. Ford also is in this class, but with the reservation that its rate of gain is less pronounced.

* * *

OBVIOUSLY, the viewpoint of the steel industry is colored by its affiliations. There is no pessimism, but varying degrees of optimism. Those steel producers who provide the bulk of the tonnage for the General Motors group and Hudson-Essex look to April and May to continue their incomparable volume of business. They have specifications which seem impossible at this time to satisfy.

Those steel producers with other connections, in the main, are a shade less hopeful and incline toward a slightly more critical view of the situation. One independent steelmaker is keeping within two weeks of its orders and is credited with planning to drop a number of open-hearth furnaces so soon as it detects a real turning.

Retail sales are now the key to the second quarter. If they open up rapidly and account not only for the overproduction of the first quarter but also the high continuing rates, then the second quarter will duplicate the first and provide impetus for the third quarter. A show of hesitancy among retail outlets, and the assembly rates at Detroit will swiftly be attuned. After three record months it is natural that the situation will bear close watching.

* * *

CONSIDERING only the steel aspects of the situation, this continues decidedly a sellers' market. A large maker of strip is booked solid eight weeks ahead. Two makers of full finished sheets have reservations for all their second quarter tonnage and already have specifications in hand against two-thirds of it. A seller of heavy products daily is turning away specifications up to 2000 tons in a lot. Following orders through to the plant rather than soliciting new business is the task of steel sales forces.

Ford purchasing agents are inquiring for 40,000 tons of steel of various classifications for shipment mostly beginning in May, it being stated that Ford is not making money at the present rate of production and hence cannot be expected to pay the advances being asked in most lines.

* * *

FORD recently reached a peak daily production for Model A of slightly more than 8300 units, but this includes replacement motors and foreign assemblies. For strictly domestic consumption Ford is turning out 6100 to 6300 units daily. This rate fluctuates, as there is a continuing check of parts and frequent changes in design. On account of bushing trouble, motor production recently dropped to 4000 daily for several days.

For Chevrolets, as well as for Fords, it may be said that demand exceeds

supply. The Chevrolet rate is 5800 to 5900 a day. The mechanical difficulties always attendant upon pushing equipment at capacity have been a handicap. Chevrolet production in April is scheduled to top that of March.

* * *

IN THE secondary group Hudson-Essex leads by a wide margin at 1900 units daily. This promises to be the best Hudson-Essex year on record.

Willys-Overland is second, at 1400 to 1600 daily, but still is slipping. Willys-Overland, De Soto and Graham-Paige appear to have overproduced in the first quarter and are understood to have a large number of unsold cars in storage.

Buick is doing better, at 900 to 950 units daily, and is reaching the point where it will begin to clean up the various parts on its 1929 model run. Oakland-Pontiac is at about 1100 units daily and Graham-Paige at 400.

* * *

NEW models are budding. Steel is being specified by Buick for its Marquette, to be its companion in the $1000 class and to be announced by **June 1.** Many rumors are afloat concerning the 1930 Buick, the most common one being that the deflation of the body is in process. The 1929 Buick is accounted one of the best of the line, from the standpoint of comfort and power, but the sales resistance has been heavy. Buick will adopt the Cadillac-La Salle system of brakes.

Chrysler also has had a hard selling year and its engineers are reported busy on "new stuff." Oldsmobile's new Viking eight has been formally announced. Hupp is maturing its $1000 car to be made in the Chandler plant at Cleveland.

The Erskine is rumored in metamorphosis from a six to a straight eight, with little change in price. It would compete with the new Roosevelt model of Marmon. Studebaker already has two eights, on the President and Commander chassis. One speculation is a merger with Nash, with Studebakers all eights and Nashes all sixes.

* * *

WHEN Ford in January produced 132,078 units and Chevrolet 86,178 they accounted for 54.2 of all cars made in that month. The February total of 125,984 Fords and 121,249 Chevrolets was 53.04 of all production. In both months a slight deduction must be made for Ford's foreign units.

If the Willys-Overland aggregate of 64,818 for these two months be included, then these three makers represented 61.1 per cent of the production's strength of the industry. Adding Hudson-Essex would lodge 70 per cent in four makers.

* * *

APPARENTLY the railroads will not stand idly by this summer and watch a large tonnage of scrap diverted to the lake trade. The present all-rail rate from Detroit to Cleveland is slated to be reduced from $3.02 per ton to $2.50, with proportionate cuts to other consuming points.

Already the first cargo of scrap for Cleveland is being assembled. The Bethlehem Steel Co. has bought considerable material from the Ford Motor Co., to be shipped as soon as Buffalo harbor is ice-free.

* * *

ACROSS the Atlantic, as here, the big contest is between Ford and Chevrolet. Through different approaches, these aggressive rivals are attempting to naturalize themselves and to tie into the more important European markets.

General Motors, as forecast, is buying into existing European companies, at one stroke eliminating competition, acquiring a going concern, and putting up a guard against tariff and other import barriers.

In getting control of the Adam Opel Co. at Russellheim, Germany, General Motors commands 45 per cent of current German automotive capacity. The Opal works employs 12,000 persons and it is understood, will manufacture the Chevrolet as well as a small car especially designed for the European high tax situation.

From this vantage point General Motors will be much more active in Germany. Whether it can use Opel as a base for its broadening European activity depends upon the tariff situation. It may be that General Motors will seek control of existing producers in France and Italy to get into local production in those countries.

While General Motors' money is coming from the United States, the policy of Ford is to enlist local capital. English, French and Belgian Ford companies already have been organized, and Holland is next. Though parts may be imported from the United States, the enterprise will bear a national stamp. Ford now makes car and truck parts at Manchester, Eng., and is building a complete manufacturing unit 12 miles from London.

Abroad, too, price is all-important. To meet the competition of Citroen, the lowest-priced Ford recently was reduced to $1004 for delivery in France. To compete with Ford, it is understood the present price of $1191 for the comparable model of Chevrolet will be sharply reduced. The 45 per cent French duty on automobiles appears not to be protecting the home industry.

Not every car and every part manufactured in Europe will displace its equivalent now imported from the United States and made from United States steel, because local production will greatly develop broader markets, but there is no gainsaying the fact that increasingly European steelworks will benefit. European steel stocks may be a good buy.

* * *

THIS quickening of the European automobile situation will have important consequences upon the steel and metalworking industries. For one thing it will doubtless develop the manufacture of full finished sheets abroad. At present, according to some important domestic interests, Europe's best sheet is no better than the single pickle grade made in this country. Just as the automotive industry in the United States demanded and obtained a higher grade sheet, so probably will the European sheet industry respond.

In the early stages, at least, the production machinery developed in the automotive industry here will be sought for the new plants in Europe. Unless these designs are protected in the various European countries, machine tool builders there may be able to copy with impunity.

Employe Benefits of Bethlehem Large

Disbursements of the Cambria plant of the Bethlehem Steel Corp. for 1928 under the new relief plan totaled nearly $200,000. Death benefits paid amounted to $94,500 while $98,242 was disbursed in sick benefits.

Deaths totaled 133, of which eight were due to accidents within the plant. Sickness totaled 65,893 days. Total disbursements for all plants of the Bethlehem company during 1928 amounted to $891,029. Participants in these benefits pay from $1 to $2 a month, according to earnings.

New Kiln Uses Steel

A new fabricated plate product has been placed on the market by the McGann Mfg. Co., York, Pa. It is a new type of lime kiln built under license from Em. Sobek, Vienna. The kiln has the lines of a blast furnace, stone and fuel being fed by a skip-hoist into an upright steel shaft lined with refractory brick, and the burned lime is withdrawn from the bottom. The kiln calls for a considerably larger tonnage of plates and castings than kilns hitherto in use in the United States.

Few Metal Duties Changed but Final Form of Tariff Is Guess

By Lynne M. Lamm

WASHINGTON, April 2.—The subcommittee of the ways and means on schedule 3, metals and manufacturers of, headed by Representative Bacharach of New Jersey and including also Representatives Watson and Timberlake, has completed its work except for watches and clocks and the report has gone to the full committee for final draft before being submitted for action. This subcommittee is one of the first to complete its task.

Mr. Bacharach, talking with the writer on the situation, although refusing to discuss any specific rates, in accordance with the general understanding entered into by the members of the ways and means committee, stated that generally speaking there have been few changes in schedule 3. The subcommittee has made an effort, he stated, to take care of some of the classifications and to deal with court decisions which have been rendered since the Act of 1922 became law, which affect the iron and steel schedules. Statements made along this line to your correspondent by Mr. Bacharach have been made for many of the other schedules of the tariff, except for the agricultural and textile schedules.

Members of the house have been talking optimistically about the passage of the tariff bill and of holding it down to few changes in accord with the thought of the present administration. It is a well known fact that it is not nearly so hard to hold the house to acting on the bill as reported by the ways and means committee as it is to get the senate to stick to any set program.

In this connection Senator Watson, of Indiana, one of the few remaining old line politicians left in congress, has recently made a statement in which he was not as optimistic as some of his friends in the lower house as to when the tariff bill could be enacted into law and as to how far the bill could be held down to few rate changes.

Senator Watson expressed the opinion that it would probably be autumn before a tariff bill could be enacted into law, while administration leaders have led congressmen and the general public to believe that the bill can actually become law around July 1.

There have been rumors about Washington for the past few days that the senate finance committee would not hold any hearings in connection with the tariff law but that it would depend upon the hearings which were held at such length by the ways and means committee. This sounds fine, but as a matter of fact, similar statements have been forthcoming at previous tariff revisions, but no such thing has been done.

As the hearings work out in actual practice, when the bill is passed by the house there are generally some inequalities and the manufacturers who believe they are discriminated against think that they are entitled to be heard by the senate committee to explain the situation. It is hard for the senate committee to refuse this request and as soon as one party has gone before the committee the door is open for further hearings, inasmuch as the committee is unable to hear one man without hearing all who request hearings.

As a matter of fact, there is not so much harmony on the tariff question as appears on the surface. It seems entirely doubtful if the large industries of the country, many of whom think that they are entitled to some tariff raises, will sit by on the fence and watch the farmers of the country get the whole tariff pie. While manufacturers generally are perfectly willing to have the farmer get his share, they are going to be equally insistent that they be given something themselves. This is what will no doubt lead to a prolongation of the tariff discussion. No one can tell at this time just how long the tariff fight will continue or what will eventually come of it, but one thing is certain, the administration will not find the situation as easy to solve as it believes.

Convention Calendar

April 8-11—American Foundrymen's association. Thirty-third annual convention and exposition at Hotel Stevens, Chicago. C. E. Hoyt, 222 West Adams street, Chicago, is secretary.

April 8-11—American Oil Burner association. Sixth annual meeting at Hotel Pennsylvania, New York. Leod D. Becker, 342 Madison avenue, New York, is secretary.

April 15-17—Concrete Reinforcing Steel institute. Fifth annual meeting at Kenilworth Inn, Asheville, N. C. M. A. Beeman, 2112 Tribune Tower, Chicago, is secretary.

April 17-19—National Foreign Trade council. Sixteenth annual convention at Lord Baltimore hotel, Baltimore. O. K. Davis, 1 Hanover Square, New York, is secretary.

April 24-25—American Welding society. Annual meeting at Engineering Societies building, New York. M. M. Kelly, 33 West Thirty-ninth street, is secretary.

April 24-25—National Metal Trades association. Annual convention at Drake hotel, Chicago. J. E. Nyhan, Peoples Gas building, Chicago, is secretary.

April 29-May 3—Chamber of Commerce of the United States. Annual meeting at Chamber of Commerce building, Washington. D. A. Skinner, 1615 H street, N. W., is secretary.

Cincinnati Scrap Men Form Chapter

Institute of Scrap Iron and Steel has organized a chapter in Cincinnati, with William M. Hilb, of Hilb & Bauer, Cincinnati, president; Samuel Summers of Joseph Schonthal Co., Columbus, O., vice president; and R. W. Kolkmeyer, of Walter Wallingford & Co., Cincinnati, secretary and treasurer. M. D. Friedman, M. D. Friedman & Co., Ashland, Ky.; Harry Silverstein, A. P. Silverstein & Son, Charleston, W. Va., Lee Workum, The Schadel-Workum Co., Portsmouth, O., and B. Shottenfels, David J. Joseph Co., Cincinnati, were elected members of the executive committee. Applications for membership in the Institute were also received from David J. Joseph Co., Cincinnati, and A. P. Silverstein Co., Charleston, W. Va.

Benjamin Schwartz, director general of the institute, was the principal speaker at the dinner preceding the meeting, which took place at the Sinton hotel, Cincinnati.

Bondholders Take Over McMyler Interstate

Bondholders of McMyler Interstate Co., Bedford, O., manufacturer of steam shovels, pile drivers and excavating machinery, have bought the land, buildings and equipment of the company for $600,000 at receiver's sale. The price was $100,000 in excess of that set as a minimum by the court. Other assets were bid in by the bondholders for $76,000. The receivership of P. A. Connolly, which started April 23, 1928, is terminated by this sale. It seems probable the bondholders will reorganize the company and continue the business.

Explore Texas Iron Ore

Engineers representing Henry L. Doherty & Co., New York, are conducting exploration work in Cass county, Texas, to determine the reserves of iron ore, oil and gas in a tract of 10,000 acres in that county belonging to the East Texas Iron Co., which has headquarters at Shreveport, La. Henry L. Doherty & Co. have an optional contract with the East Texas Iron Co. dated to expire in October, 1929.

European Outlook Is Brighter

British Furnace Interests Increasing Pig Iron Production—Coke and Scrap Scarce—Tin Plate Demand Brisk—Clyde Shipbuilders Have a Record Month—French Export Prices Higher—Seasonal Activities Expanding

European Headquarters,
IRON TRADE REVIEW,
Caxton House, Westminster, S. W.1

LONDON, April 2.—(*By Cable*)—The second quarter begins with good prospects in European iron and steel markets. In Britain additional blast furnaces are being lighted to relieve the shortage of pig iron in some districts. Coke is scarce and prices are rising. A marked revival is noted in demand for tin plate, due to the determination of makers to increase prices.

British tin plate mills are booked up for the second quarter. Scarcity of steel scrap is a serious factor. The volume of business with the Clyde shipbuilders in March was a record for the month, and for the first quarter the orders were the third best in history.

In France export prices have been advanced, due to growing domestic demand. Sales of semifinished steel are brisk. Substantial sales of basic pig iron are reported in Belgium. Seasonal activity in Germany is bringing out large orders for structural materials. The domestic market for pig iron in Germany is brisk, but exports are dull. Finished steel is firm.

British Steel Recovery Continues Progress

LONDON, March 15.—(*European Staff Service*)—Following the active conditions which prevailed a month ago in iron and steel export markets there is at present a comparative lull as far as the booking of new orders is concerned. On the other hand, better weather conditions enable a certain tonnage of backward orders to be shipped to destinations in larger quantities. Owing to the fact that continental prices remain firm, conditions in the British domestic market are improving. Quotations of British producers, even for export business, show a tendency to advance, partly owing to increased cost of raw materials, and partly owing to continental firmness. There is some inquiry for finished material, but only a small volume materializes. Middlesbrough foundry pig iron now is £3 7s ($16.10) f.o.b., the price having previously remained at £3 6s ($15.85) since April, 1928. East coast hematite pig iron also has risen by 1s (24c) per ton. Since the beginning of the year billets have risen from £6 5s ($30.20) to £6 10s ($31.35), and galvanized sheets now are £13 12s 6d ($69.25), against £13 10s ($68.65) at the beginning of January.

An interesting contract for 20 heavy locomotives has been obtained by Sir W. G. Armstrong, Whitworth & Co. Ltd., for the Argentine. Among other engineering contracts received lately by British firms are a new bridge, costing half-a-million pounds, to be built at Lagos harbor, by Head, Wrightson & Co. Ltd., Thornaby-on-Tees; the replacement of the superstructure of four bridges in Egypt, by Dorman, Long & Co. Ltd.; 45 bogey trucks for the Ceylon railroads, by Hurst, Nelson & Co. Ltd., Motherwell; two Garrett locomotives for Buenos Aires and 14 locomotives for Portuguese West Africa, by Beyer, Peacock & Co. Ltd.; 60 heavy locomotive boilers for the Indian state railways, by the Vulcan Foundry Ltd., and a number of vessels by various yards.

Reports from the continent are that

Current Iron and Steel Prices of Europe

Dollars at Rates of Exchange, April 1	*British* Gross Tons U. K. Ports		*French* Metric Tons Channel Ports		*Belgium and Luxemburg* Metric Tons Channel Ports		*German* Metric Tons Rotterdam or North Sea Port	
Export Prices f. o. b. Ship at Port of Dispatch—By Cable								
PIG IRON		£ s d		£ s d		£ s d		£ s d
Foundry No. 3, Silicon 2.50-3.00	$16.25	3 7 0	$16.98	3 10 0	$16.98	3 10 0	$16.49	3 8 0
Basic	15.76	3 5 0	16.01	3 6 0	16.01	3 6 0	15.76	3 5 0
Basic-bessemer	17.58	3 12 6†	16.01	3 6 0	16.01	3 6 0	15.76	3 5 0
Hematite, Phosphorus 0.02-0.05	17.95	3 14 0	23.66	605*	.....	.....	17.46	3 12 0
SEMIFINISHED STEEL								
Billets	$30.92	6 7 6	$25.46	5 5 0	$25.46	5 5 0	$25.22	5 4 0
Wire rods	41.83	8 12 6	30.92	6 7 6	30.92	6 7 6	30.31	6 5 0
FINISHED STEEL								
Standard rails	$37.59	7 15 0	$31.53	6 10 0	$31.53	6 10 0	$32.01	6 12 0
Merchant bars	1.79c	8 5 0	1.35c	6 3 0	1.35c	6 3 0	1.36c	6 4 0
Structural shapes	1.60c	7 7 6	1.11c	5 1 0	1.11c	5 1 0	1.12c	5 2 0
Plates, ship, bridge and tank	1.76c	8 2 6	1.39c	6 6 0	1.39c	6 6 0	1.40c	6 7 6
Sheets, black, 24 gage	2.28c	10 10 0	2.26c	10 5 0	2.26c	10 5 0	2.50c	11 7 0
Sheets, galvanized, 24 gage, corrugated	2.90c	13 7 6	3.01c	13 13 9	3.01c	13 13 9	3.43c	15 12 0
Bands and strips	2.17c	10 0 0	1.40c	6 7 6	1.40c	6 7 6	1.40c	6 7 6
Plain wire, base	2.06c	9 10 0	1.71c	7 15 0	1.71c	7 15 0	1.71c	7 15 0
Galvanized wire, base	2.93c	13 10 0	2.17c	9 17 6	2.17c	9 17 6	2.20c	10 0 0
Wire nails, base	2.39c	11 0 0	1.80c	8 3 9	1.80c	8 3 9	1.76c	8 0 0
Tin plate, base box 108 pounds	$ 4.37	0 18 0	.....	.....	.....	.....	$ 6.79	1 8 0
*Francs								
Domestic Prices at Works or Furnace—Last Reported			Francs		Francs		Marks	
Foundry No. 3 Pig Iron, Silicon 2.50—3.00	$16.25	3 7 0	$18.57	475(2)	$16.82	605	$18.50	78
Basic pig iron	15.76	3 5 0	19.94	510(1)	16.96	610	20.87	88
Furnace coke	3.52	0 14 6	5.87	150	5.56	200	5.10	21.50
Billets	30.92	6 7 6	23.07	590	25.99	935	28.70	121
Standard rails	1.79c	8 5 0	1.46c	810	1.63c	1,250	1.51c	140
Merchant bars	1.79c	8 5 0	1.36c	755	1.41c	1,085	1.52c	141
Shapes	1.71c	7 17 6	1.26c	700	1.22c	940	1.49c	138
Plates, ship, bridge and tank	1.87c	8 12 6‡	1.54c	855	1.46c	1,125	1.71c	158
Sheets, black, 24-gage	2.28c	10 10 0	2.92c	1,620	2.70c	2,080	2.43c	225
Sheets, galvanized 24 gage, corrugated	2.93c	13 10 0	3.69c	2,050	3.84c	2,950	3.78c	350
Plain wire	2.06c	9 10 0	1.89c	1,050	2.08c	1,600	2.48c	230
Bands and Strips	2.17c	10 0 0	1.51c	840	1.76c	1,350	1.77c	164

*Middlesbrough; †Scotch foundry iron; ‡delivered; (1) Basic-bessemer; (2) Longwy. British export furnace coke £0 14s 6d ($3.52) f. o. b. Ferromanganese £21 13s, 0d ($105.00) delivered Atlantic seaboard, duty-paid. German ferromanganese £15 0s 0d ($72.75) f. o. b.

The equivalent prices in American currency are in dollars per ton for pig iron, coke, semi-finished steel and rails; finished steel is quoted in cents per pound and tin plate in dollars per box. British quotations are for basic open-hearth steel; French, Belgian, Luxemburg, and German are for basic-bessemer steel.

export trade is calmer, but the works are well booked with orders. Deliveries extend from three to six months, and prices are firm. Foundry pig iron, 2.5 to 3 per cent silicon, is about £3 8s ($16.45) f.o.b. Antwerp, and it is possible that the Franco-Belgo-Luxemburg entente may increase the price as from April 1. Semifinished steel is practically unobtainable. Merchant bars, which were about £6 ($29.10) at the beginning of the year, now are £6 3s ($29.85), and beams have risen from £5 ($24.25) to £5 2s 6d ($25.85). Sheets also constitute a stronger market, and advances have been made in wire products prices. The above quotations apply to France, Belgium and Luxemburg. German makers are striving to make up for quiet conditions in the home market by taking orders for export. Owing to shorter periods of delivery, they can command a slightly higher price than their western competitors. They also can supply some semifinished steel. An order for 2000 tons of blooms, billets and sheet bars for Japan has been taken at the following prices: £4 19s ($23.85) for the blooms, £5 4s ($25.15) for the billets, and £5 6s 6d ($25.65) for the sheet bars. The British have bought 2-inch billets at £5 4s ($25.15) f.o.b. port of shipment.

It is expected that the Erma, at its next meeting, will increase the export price of rails by about 5s ($1.20) per ton. Interest centers on the coming meetings of the various German syndicates. It is rumored that there will be considerable opposition to their renewal on the part of leading interests unless they all are renewed on modified terms. If the German syndicates were broken up, the position of the European steel entente would be considerably weakened.

Belgium Breaks Record

Brussels, March 5.—(*European Staff Service*)—Belgian iron and steel works started the year by breaking all previous records of production. The output of pig iron in Belgium during January was 350,680 metric tons, as compared with 345,280 tons, the previous high mark, in December, 1928.

The output of steel ingots and castings in January was 357,010 metric tons, as against 333,320 tons in December, 1928, and 356,350 tons, the previous high mark, in October, 1928. The January output included 346,820 tons of steel ingots and 10,190 tons of steel castings, the output in each class constituting a record. Production of finished steel in January was 313,000 metric tons, which also constituted a record and compares with 287,790 tons in December and 309,600 tons, the previous high mark, in October, 1928.

The following table gives figures:

Mon. ave.	Coke	Act. Furn.	Pig iron	Steel ingots and castings	Finished steel
1913	294,000	....	207,055	205,550	154,920
1926	413,000	....	283,270	281,160	231,810
1927	448,880	....	312,620	309,040	255,185
1928	493,885	....	325,445	327,870	281,125
1929					
Jan.	513,550	56	350,680	357,010	313,000

German Trade Grows

Berlin, March 19.—(*European Staff Service*)—Exports of pig iron and ferroalloys from Germany in January were 31,820 metric tons, as against 23,994 tons in December, 1928. Among the principal items of steel exported were: Bars, shapes, hoops and bands, 94,178 tons; wire rod and wire, 43,168 tons; plates and sheets, black, 31,948 tons; forged tubes, 23,190 tons; semi-finished products, 23,008 tons; rails and track material, 22,735 tons; forgings, 18,014 tons. The tonnage of scrap exported in January was 43,154 metric tons.

Imports of pig iron and ferro-alloys into Germany in January were 22,334 metric tons, as against 21,719 tons in December, 1928. Among the principal items imported were: Bars, shapes, hoops and bands, 61,510 tons; semifinished steel, 36,615 tons; rails and track material, 11,586 tons. The tonnage of scrap imported was 14,739 metric tons. The following table gives figures:

Mon. ave.	IMPORTS Pig iron	IMPORTS Other iron and steel	EXPORTS Pig iron	EXPORTS Other iron and steel
1926	9,230	95,890	42,730	402,905
1927	23,895	217,505	29,910	347,645
1928	25,535	174,250	24,585	394,575
1929				
Jan.	22,334	154,293	31,820	387,769

French Ore at Record

Paris, March 13.—(*European Staff Service*)—The extraction of iron ore in France during January reached the highest point on record with 4,535,282 metric tons, as compared with 4,042,157 tons in December, 1928, and 4,509,252 tons, the previous high mark, in October of the same year.

The following table gives figures:

Mon. ave.	Production	Stocks at end of month
1913	1,826,500	.....
1926	3,269,033	.....
1927	3,723,200	.....
1928	4,109,780	.....
1929		
January	4,535,282	2,683,084

Belgian Trade Larger

Brussels, March 19.—(*European Staff Service*)—Exports of iron and steel from Belgium and Luxemburg during 1928, according to provisional figures issued by the ministry of finance, were 4,564,689 metric tons, just a little over the exports of 1927, which were 4,483,061 tons. These figures do not include scrap. There was a substantial decrease in exports of pig iron and ferroalloys, which fell from 135,010 metric tons in 1927 to 98,863 tons in 1928. Another substantial drop was registered for semi-finished steel, the exports in 1927 being 911,805 metric tons, while in 1928 they were only 588,853 tons. Exports of rails and track material also fell from 332,095 metric tons in 1927 to 291,621 tons in 1928, and exports of cast iron pipe receded from 45,045 tons to 31,559 tons.

Exports of ingots increased from 24,689 metric tons to 36,698 tons, exports of bars and shapes from 1,982,788 metric tons to 2,011,581 tons, and exports of wire rod and wire from 216,484 tons in 1927 to 319,083 tons in 1928.

Exports of plates and sheets nearly doubled, the figures being 368,984 metric tons in 1927 and 675,260 tons in 1928. There was an increase in exports of scrap, which were 194,200 tons in 1927 and 234,937 in 1928.

Imports of iron and steel, except scrap, into Belgium and Luxemburg during 1928 totaled 896,349 metric tons, against 648,334 tons in 1927.

French Steel Market Steady as Fuel and Steel Remain Scarce

Franc—3.91c

PARIS, March 15.—(*European Staff Service*)—Little change is recorded in the French iron and steel market. There seems to be less demand in certain descriptions, but prices remain firm, thanks to the large volume of orders previously received. It is believed that requirements remain considerable, and it is expected that when the weather becomes more favorable there will be a revival of activities in the building trade and for public works. Consequently, the underlying conditions of the market are satisfactory. Following the severe cold weather, circulation on the waterways is not yet normal, although navigation now is possible on the Rhine. A general resumption of business is expected at the end of March.

Producers find it difficult to obtain sufficient fuel. The coal mines have received a large volume of orders and can deliver only gradually. It is expected that a rise in prices may occur April 1. The shortage of pig iron in the domestic market is aggravated by transport difficulties. The hematite comptoir for export trade now is definitely constituted. Semi-finished steel is practically impossible to obtain. The price of merchant bars remains stable, but demand has somewhat receded, partly because considerable contracts were placed while prices were going up. For the time being users do not seem anxious to be overladen with stocks, and as a result, periods of delivery are slightly shortened.

Merchant bars are quoted at 760 to 770 francs ($29.50 to $30) in the north and 750 to 770 france ($29 to $30) in the east. There is no change in plate prices, but light gage sheets are firm. Plates are quoted at about 805 francs ($32.50), and medium-sized sheets at about 865 francs ($33.70) in the north and the light sizes at about 1135 francs ($43) in the east and 1175 francs ($45.60) in the north. The wire products department is satisfactory. Wire nails are about 1325 francs ($51.70), and black wire is about 1215 francs ($47.25).

The automobile industry remains active, and foreign competition does not have much effect on the business of manufacturers of cars made on a mass production basis.

Here and There in Industry

Timely Information Which Records Developments in Various Lines of Productive Enterprise

AMERICAN RADIATOR CO., New York, and Standard Sanitary Mfg. Co., Pittsburgh, have completed their merger by the incorporation in Delaware of the American Radiator & Standard Sanitary Corp. Clarence M. Wooley, chairman of the board of American Radiator, has been elected to the same post in the new company, with Theodore Ahrens, president of Standard Sanitary, as president; Charles L. Hodges, American Radiator, vice president; Rolland J. Hamilton, secretary and treasurer, and Henry L. Weimer, assistant treasurer. The plan of exchange is operative and the privilege of deposit has been extended to May 1.

* * *

A. O. SMITH CORP., Milwaukee, will build a further addition, 80 x 600 feet, one story, brick and steel.

* * *

HENRY LINDAHL MACHINE CO., 5900 Ogden avenue, Chicago, has changed its corporate name to the Henry Lindahl Foundry & Machine Co.

* * *

TRUE-TONE CORP., Buffalo, has started building a new plant at Johnsonburg, Pa., 80 x 100 feet, three stories, for the production of electrical apparatus.

* * *

ROBESON PROCESS CO., New York, has removed its offices from the Fifth Avenue building, 200 Fifth avenue, to the New York Central building, 230 Park avenue.

* * *

AMERICAN INSTITUTE OF STEEL CONSTRUCTION INC., New York, has moved its executive offices to the International Combustion building, 200 Madison avenue.

* * *

CARBORUNDUM CO., Niagara Falls, N. Y., has opened its new Carborundum building, 2759 East Grand boulevard, Detroit. The building has been open for inspection since March 15.

* * *

DANLY MACHINE SPECIALTIES INC., Chicago, maker of standardized die sets, has recently opened a warehouse and assembly plant at 16 Commercial street, Rochester, N. Y., in charge of A. F. Wallace. A complete stock of die sets and diemakers' supplies is carried. Mr. Wallace was connected with the New York office of the Danly Machine Specialties for a number of years.

* * *

AMERICAN CRANE CO., Friendship, N. Y., has been awarded a contract for four large gantry cranes for the Water Front Service Corp., Brooklyn. Nearly a year will be required for completion of the contract.

* * *

CENTURY ELECTRIC CO., St. Louis, has established a stock of its products in the public warehouse of the Neilston Warehouse Co., Columbus, O. Orders will be filled through the sales office at 958 Hanna building, Cleveland.

* * *

DECATUR CASTINGS CO., Decatur, Ind., James Cowen, manager, has leased the foundry department of the Decatur Foundry, Furnace & Machine Co. and will enlarge its output. Increased orders made necessary the expansion.

* * *

WILLIAM H. MULLER & CO. INC., and the Iron & Ore Corp. of America, have been moved from 11 Broadway, New York, to a suite in the new Chanin building, 122 West Forty-second street. Paul G. Leoni is president of both companies.

* * *

TAYLOR AIRCRAFT CO., will erect a new plant at Bradford, Pa. L. S. Bannister, general manager of the Taylor company, will be in charge of construction of the plant which will succeed the Rochester, N. Y., production headquarters of this firm.

* * *

HARRISON RADIATOR COVER CO., 4225 West Kenzie street, Chicago, has purchased the plant of the Standard Stamping & Perforating Co., 4718-22 West Fifth avenue, Chicago. The Standard Stamping & Perforating Co. is continuing in business and intends to erect a new and larger building for its own purposes.

* * *

EBEL HOIST & PUMP CO., Lansing, Mich., has been organized to succeed the Lansing Motor & Pump Co. John Ebel is president. Capital has been increased from $10,000 to $75,000. The company manufactures drag line hoists for gravel pits and heavy duty gravel pumps.

* * *

DITTMER GEAR & MFG. CO., Lockport, N. Y., re-elected President A. H. Dittmer and other major executives at its annual meeting and made Charles W. Christy vice president. Reports showed the company is operating its business at capacity and has unfilled orders indicating a continuation of similar production for several months.

* * *

GENERAL ELECTRIC CO., Schenectady, N. Y., is to move manufacturing operations of its Baltimore plant to Philadelphia, leaving the brass foundry in operation at Baltimore. The plant will be available for use whenever necessary. The change is made to concentrate similar lines of production at the Philadelphia plant.

* * *

GLIDDEN CO., Cleveland, has taken over the Metals Refining Co., Hammond, Ind., to provide crude materials for its paint manufacturing operations. William Wilke, president of the Hammond company, will become a member of the board of the Glidden company and vice president of the Metals Refining Co. of Ohio, a subsidiary.

* * *

WINNIPEG BRASS & FIXTURE CO., Winnipeg, Man., has changed its name to Winnipeg Brass Ltd. The company was first established as a partnership in 1910 and continued to operate under this arrangement until May 1, 1928, when it was incorporated. A. G. Burton is president and general manager, A. E. Garbut, vice president and general superintendent, and C. L. Williams is secretary.

* * *

COOPER-BESSEMER CORP., formed recently by merger of the C. & G. Cooper Co. and the Bessemer Gas Engine Co., has chosen E. J. Fithian, president of the Bessemer company, chairman of the board, and B. B. Williams, president of the Cooper company president and general manager of the new concern. Other officials will be chosen from the executives of the two companies.

Practically no change will be made in sales and service organizations.

* * *

MORSE-COBURN STEEL CO., Lowell, Mass., has been organized as a steel warehouse and wholesaler in hardware and mill supplies.

* * *

ERMAN-HOWELL & CO. INC., buyers and sellers of iron and scrap, Chicago, have moved into larger quarters to 1537 McCormick building, Chicago, from 652 McCormick building.

* * *

KELSEY-HAYES CORP., Detroit, and Wire Wheel Corp., Buffalo, are nearing merger of their interests under the name of the former, directors of both companies having approved the proposed terms. Stockholders will vote on the plan April 25. The companies have facilities for production of 2,150,000 sets of wheels and brake drums and other automotive accessories.

* * *

McKEESPORT TIN PLATE CO., McKeesport, Pa., has elected E. R. Crawford president, G. V. Parkins vice president, Dr. F. T. Nason chairman of the executive committee and H. H. Frey secretary-treasurer. Directors have been re-elected.

* * *

PANGBORN CORP., Hagerstown, Md., has taken over the goodwill, patterns, records and drawings of the Universal Shot & Sand-Blast Mfg. Co., Hoboken, N. J. This company's equipment, parts and supplies will be manufactured by the Pangborn organization. Robert E. Donnelly and Frank C. Weber, former owners of the Universal company, now are associated with the Pangborn organization.

* * *

HARDINGE CO. INC., York, Pa., is concluding shipment of six large coal pulverizer units to be installed by the Anheuser-Busch Co., St. Louis. These pulverizers have capacity of 4½ tons of coal each per hour.

* * *

OLIVER FARM EQUIPMENT CO. has been formed by merger of the Hart Parr Tractor Co., Charles City, Iowa, Oliver Chilled Plow Works, South Bend, Ind., and Nichols & Shephard Co., Battle Creek, Mich. Melvin W. Ellis, president of the Hart Parr company, is president of the new company; J. D. Oliver, president of the Oliver company, is chairman of the board of directors and Lewis J. Brown, president of the Nichols & Shepard Co., is executive vice president.

* * *

FEDERAL SCREW PRODUCTS CO., Detroit, which recently acquired the Michigan Screw Co., Lansing, Mich., as reported in IRON TRADE REVIEW of Jan. 31, has also taken over the Chelsea Screw Co., Chelsea, Mich. The latter company specializes in the production of brass screws and screw machine products. Federal Screw Products Co. plans further expansion and contracts have been let for an 80 x 400-foot addition to the plant at 3401 Martin street, Detroit. This building will be used for production and storage. The officers of Federal Screw Products are: President, D. S. Diamond; vice president, R. A. Gunn; and secretary-treasurer, B. L. Maas.

* * *

CAMM-BLADES MACHINERY CO., Milwaukee, is a new Wisconsin corporation organized with $50,000 capital to give corporate form to a business conducted under a similar title for several years at 610 Michigan street. The principals are John A. Camm, at one time sales manager of the Kearney & Trecker Co., and George V. Blades. The concern represents the Seneca Falls Machine Co., Liberty Machine Tool Co., Western Machine Tool Works, Springfield Machine Tool Co., Hardinge Bros., Chicago, H. R. Krueger, Detroit, and the W. B. Knight Machine Co. It also represents the cutting tools of the Michigan Tool Co., Colonial Tool Co., Reisinger Tool Co., Buckeye Twist Drill Co. and Groov-Pin Corp.

1928 Steel Rail Production Down; Heavier Sections Show Increase

FOR the second consecutive year production of steel rails in the United States has declined, according to official figures of the American Iron and Steel institute. Total production in 1928 was 2,647,493 tons, compared with 2,806,486 tons in 1927, a decline of 5.66 per cent. From 1926 to 1927 the loss was 12.78 per cent. The 1928 total was less than the 2,785,257 tons produced in 1925 and slightly better than the tonnage rolled in 1924.

Open-hearth rails constituted 97.46 per cent of the total, bessemer rails 0.10 per cent and all others 2.44 per cent. The corresponding percentages in 1927 were, open-hearth 96.84 per cent, bessemer 0.06 per cent and others 3.10 per cent. Bessemer rails increased somewhat in tonnage, while open-hearth and rails by other processes declined.

Rails rerolled from new seconds and new defective rails totaled 6533 tons, all of open-hearth steel. Those rerolled from old rails totaled 64,196 tons, a total of 70,729 tons produced by rerolling. In 1927 this was 92,633 tons.

Classified by weight per yard 134,197 tons were under 50 pounds, 125,726 tons were between 50 and 85 pounds, 465,393 tons between 85 and 100 pounds, 1,203,749 tons between 100 and 120 pounds and 718,428 tons 120 pounds and over. The latter classification is the only one showing a tonnage increase.

Alloy-treated rails in 1928 totaled 6453 tons, compared with 1265 tons in 1927, and 4216 tons in 1926. Of this total 3711 tons were of titanium alloy.

Pennsylvania led in total tonnage, with 695,184 tons, from five plants. Alabama has three mills and Ohio, Indiana and Illinois two each.

Production of Rails by Processes

Years	Open-hearth	Bessemer	Rerolled*	Electric	Total
1913	2,527,710	817,591	155,043	2,436	3,502,780
1914	1,525,851	323,897	95,169	178	1,945,095
1915	1,775,168	326,952	102,083	.....	2,204,203
1916	2,269,600	440,092	144,826	.....	2,854,518
1917	2,292,197	533,325	118,639	.....	2,944,161
1918	1,945,443	494,193	101,256	.....	2,540,892
1919	1,893,250	214,121	96,422	50	2,203,843
1920	2,334,222	142,899	126,698	297	2,604,116
1921	2,027,215	55,559	96,039	5	2,178,818
1922	2,033,000	22,317	116,459	.....	2,171,776
1923	2,738,779	25,877	139,742	118	2,904,516
1924	2,307,533	16,069	109,730	.....	2,433,332
1925	2,691,823	9,687	83,747	.....	2,785,257
1926	3,107,992	12,533	97,124	.....	3,217,649
1927	2,717,865	1,566	87,055	.....	2,806,486
1928	2,580,141	2,718	64,196	438	2,647,493

*Rerolled from old steel rails.

Machinery

Most Dealers Have a Large Carry-Over Into April—Individual Orders Continue to Feature Market—Inquiry Is Brisk

ORDERS for machine tools in lots of one to three items reached a large volume during the week just closed. Dealers in the East report a substantial quantity of inquiries for diversified lines of equipment. The first quarter was one of the most active from the sales standpoint experienced by dealers in many years. Sales during March reached a high peak. Grinding machinery continues in fairly heavy demand. Two manufacturers of disk-type grinders have announced a price advance of 10 per cent. Several western railroads have added to their recent list of inquiry. More activity is being shown in the Milwaukee district. Inquiry for used tools for installation in the Chicago district is heavy but difficulty is met in obtaining prompt delivery.

New York, April 2.—Machine tool buying continues highly active. While few large orders or inquiries have been reported over the past few days, a heavy volume of orders for one or two machines have been placed and fresh inquiries are numerous. A substantial tentative list for estimation purposes is that of Ford, Bacon & Davis, engineers, for a project in the South.

The quarter just closed has been one of the most active in recent years, with March an unusually good month. One seller of turret lathes reports March one of the most active months he had ever experienced. The price situation is featured by an advance of approximately 10 per cent by at least two manufacturers of disk grinders. The electric overhead crane market is featured by the closing of 21 cranes by the Chesapeake & Ohio railroad.

Worcester, Mass., April 2.—Buying of machine tools is inclined to be less regular. Demand for equipment from several fields, including automobile, textile and radio, appears to be filled for the time being. Business booked is far ahead of recent years and steady operations are assured in many instances to the middle of the year. Grinding machinery is steady. Production units are selling well. Small individual orders continue to feature the market, bringing the total up satisfactorily. The market appears to be passing through a breathing spell on new business which enables manufacturers to adjust schedules.

Pittsburgh, April 2.—March sales of machine tools were slightly below the February total, but the outlook still is promising. A fair volume of business remains pending. Prospective business is included with plant construction for the National Tube Co., A. M. Byers Co. and Davison Coke & Iron Co. The crane market is quiet from the standpoint of awards, but considerable work is pending.

Chicago, April 2.—Machine tool inquiries are brisk. While sales in the week just fell off slightly from the volume earlier in the month, most houses found March sales ahead of February, and recent intimations that the first quarter would finish ahead of 1928 are believed to have been borne out. Most dealers have a large carry-over into April. Several western railroads have added to recent inquiry lists, and the Pullman Car & Mfg. Corp. is asking bids on several additional items for its Birmingham, Ala., works, including a No. 4 vertical and a No. 5 milling machine, three double-head grinders, a 12 x 24-inch cylindrical grinder, a 12-foot knife grinder and an upright roller-type cutter. Chicago & North Western railroad is inquiring for a 600-ton wheel press and a journal and axle lathe. Chicago, Burlington & Quincy railroad also has added to recent inquiries with offers for a 30-inch lathe, two tool-room lathes, one 16 and the other 18-inch, and a single spindle drill. Rock Island is taking bids on a 16-inch lathe, a 1½-inch forging machine and a punch press. Neither Rock Island nor Santa Fe has started buying against previous inquiries. More activity is being shown in the Milwaukee district. A. O. Smith Corp., Milwaukee, again has made some purchases. A bed spring manufacturer has a list out, and several important industrial lists have appeared in Illinois and Iowa. An advertising display concern in this district purchased sheet metal working equipment, four presses and squaring shears. Inquiry for used tools is heavy, from the Chicago district and from users in adjoining territory.

Cleveland, April 2.—Sales of machine tools during the first quarter reached the highest mark in several years. The beginning of this quarter finds sellers with well filled order books but hampered in promising deliveries on account of the inability of builders to supply demand. Meanwhile inquiry is holding at a high level. Buying of tools by the automotive industry has slowed down and at present business coming from this class of the trade represents replacements. Sales of used tools still are from one to three tools per order; requirements include a wide list of items.

CRANE ORDERS PLACED

Twenty-one electric overhead cranes for Huntington, W. Va.,' and Russell, Ky., shops of the Chesapeake & Ohio railroad, to Whiting Corp.; specifications include one 250-ton, one 10-ton and 19 15-ton cranes.

Eight electric overhead cranes for Devine Mfg. Co., Mt. Vernon, Ill., subsidiary of the Mt. Vernon Car Mfg. Co., to Shaw Crane-Putnam Machine Co.; specifications include 35-ton crane, 5-ton auxiliary, 75-foot span; 30-ton crane, 5-ton auxiliary, 55-foot span; 10-ton crane, 55-foot span; 10-ton crane, 75-foot span; 10-ton crane, 22-foot 6-inch span; two 5-ton cranes, 50-foot span; and 5-ton, 45-foot span.

Three electric overhead cranes for a company in New York Metropolitan district to Whiting Corp.

Three 15-ton electric overhead cranes for Amtorg Trading Corp., 165 Broadway, for shipment to Russia, placed, contract reported going to Whiting Corp.

Two 6-ton truck cranes for Patrick McGovern Inc., New York, to Universal Crane Co.

Among single orders are: 50-ton locomotive crane for Texas Co., for installation at Port Arthur, Tex., awarded an unnamed builder; 5-ton, 3-motor crane, 40-foot span, for Central Structural Steel Co., New York, to Shepard-Niles Crane & Hoist Corp. This is a reinstatement of a recently reported roder, accompanied by a change in specifications; 150-ton, 4 motor cranes, 86 foot span, for Phoenix Utility Co., New Yok, to Cleveland Crane & Engineering Co.; one 25-ton crane, 37-foot span for Gulf Coast, International & Great Northern railroad, Kingsville, Tex., shop, to Shaw-Crane-Putnam Machine Co.

CRANE ORDERS PENDING

5 to 10-ton used electric crane, 40 to 50-foot span, for United Welding Co. of Middletown, O.; crawler type drag line crane, equipped with a 40-foot boom and a 3-yard capacity bucket, county auditor, Dallas, Tex., bids to be opened April 22.

Three electric semiportal gantry cranes and two clamshell ore handling buckets for the McComas street terminal improvements, Baltimore, bids to be opened by port development commission, that city, April 10.

Used crawler crane, equipped with magnet, for the Nassau Salvage Corp., Oceanside, L. I., bids asked by Ralph Metals Corp., Woolworth building, New York, the holding company; ash handling crane for New York Edison Co., New York, award expected at once.

To Spend More on Lines

The American Telephone & Telegraph Co., New York, has authorized the expenditure of $82,000,000 on new long distance facilities in 1929, according to P. G. Miller, general superintendent of the long lines department. This is an increase of 67 per cent over the amount spent by the company for similar work in 1928, the previous record. Nearly half of the $82,000,000 will be spent on extending and supplementing existing long distance cable systems. About 2500 miles of cable will be laid this year.

Sees Harm in Gas Project

Birmingham, Ala., April 2.—Gov. Bibb Graves, of Alabama, is opposing the project to lay a natural gas pipe line from the Louisiana fields to Alabama portions. Opposition is based on the claim that to

bring in natural gas would injure the market for by-product gas, and that the coal business, from which the state recieves a tonnage tax, would be affected.

Steel Barrel Output Rise Continues

Washington, April 2.—Steel barrel production continued to advance in February, according to statistics of the department of commerce. Members of the Steel Barrel Manufacturers' association, Cleveland, report shipments of 372,528 barrels and unfilled orders of 493,290 barrels. Average daily productive capacity of I.C.C. barrels was 27.7 per cent, light barrels 46.5 per cent and all barrels 42.6 per cent. Monthly comparisons follow:

1928	Production	Shipments	Unfilled orders for delivery within 30 days	Unfilled orders for delivery beyond 30 days
Jan.	475,906	474,159	241,145	1,110,652
Feb.	518,944	514,362	297,889	1,119,738
Mar.	636,855	644,521	304,043	1,039,540
Apr.	667,827	661,949	357,131	919,863
May	696,281	694,843	324,549	932,568
June	712,779	717,496	319,443	840,313
July	647,844	645,881	341,346	891,066
Aug.	677,313	675,600	319,495	744,863
Sept.	593,255	595,640	292,686	704,134
Oct.	656,021	661,009	301,782	522,090
Nov.	563,647	568,353	322,135	634,982
Dec.	551,113	549,913	246,460	1,110,983
Total (year)	7,397,784	7,403,726	.....	.....
1929				
Jan.	558,492	548,581	319,704	1,342,006
Feb.	567,398	563,532	345,365	1,198,481

Foundry Operates Safely

Whiting Corp., manufacturer of cranes, foundry equipment and railway specialties, operated its plant at Harvey, Ill., more than 59 days without a lost time accident. The fifty-ninth day was reached March 22. The company operates a foundry making gray iron and steel castings, also a pattern shop, forge shop, structural shop, and power house. It employs 600 persons in its plant. Considering the hazards involved, the 59 no-accident days constituted an unusual record.

Electric Profits Gain

Toronto, Ont., April 2.—Net profits of the Canadian General Electric Co. for 1928, after deducting for reserves, taxes and depreciation, were $3.695,665, compared with $2,103,053 in 1927. The company expended during the year $892,641 for additional machinery.

Electric power consumed for industrial purposes in Worcester, Mass., in December increased 10 per cent over December, 1927.

Koppers Interests Increasing Participation in Steel Industry

INTERESTS of the Koppers Co., Pittsburgh, have been further ramified in recent months and intrench it more deeply in the iron and steel industry. The most important development this year was the passing of control of the Alan Wood Iron & Steel Co., Philadelphia, to Alan Wood Steel Co., an organization formed by Henry B. Rust, president of the Koppers Co., and Scott Stewart, president of W. J. Rainey Inc., New York. The Alan Wood Steel Co. also owns all of the stock of the Rainey-Wood Coke Co. which operates by-product coke ovens at Swedeland, Pa. The Alan Wood company operates a blast furnace at Swedeland, and open-hearth furnaces, blooming mill and plate mill at Ivy Rock, Pa. Sheet mills are at Conshohocken, Pa.

Other iron and steel affiliations of the Koppers Co. include a half interest in the Hamilton Coke & Iron Co., Hamilton, O., control of which is shared with the American Rolling Mill Co., Middletown, O. The Hamilton company, of which H. B. Rust is president, operates a blast furnace and by-product coking plant.

The Koppers Co. also is interested in the Davison Coke & Iron Co., Pittsburgh, formed a short time ago to take over the Sharpsville Furnace Co., which operates a merchant blast furnace at Sharpsville, Pa., and to engage in the production of pig iron, by-product coke and cement at a plant now under construction at Neville Island, Pittsburgh district. H. B. Rust is a director of the Davison company. The cement plant and by-product coke ovens now are being constructed. The blast furnace was purchased last year from the American Steel & Wire Co., and operations are expected to begin in June of this year. This project will provide the Davison company with the only merchant blast furnace in the Pittsburgh district.

Major activities of the Koppers Co. are confined to the construction and operation of by-product coke plants. With the field for new installations of coke ovens eventually being limited, the company some time ago turned its attention to the operation of such plants and sale of gas, coke and by-products. At present the Koppers Gas & Coke Co., a subsidiary organization, has listed among its wholly owned subsidiary companies, the following: Seaboard By-Product Coke Co., Jersey City, N. J.; Minnesota By-Product Coke Co., St. Paul; Milwaukee Coke & Gas Co., Milwaukee; Koppers-Kokomo Co., Kokomo, Ind., and Connecticut Coke Co., New Haven, Conn. A half interest has been acquired in the Montreal Coke & Mfg. Co., Montreal. Investments in other companies not listed as wholly-owned subsidiaries give the Koppers organization control in certain instances. This is found to be true in the cases of several eastern gas utility companies.

The Koppers Co., a Delaware company, is the holding organization for the various subsidiaries. These include among others the Koppers Co. (Pa.), an operating company, Koppers Construction Co., American Tar Products Co. Inc., Bartlett Hayward Corp., Koppers Building Co., Koppers Erecting Corp., Koppers Coal Co., Koppers Gas & Coke Co., Koppers Development Corp., and Western Gas Construction Co.

Some of these companies control smaller subsidiary companies. The Koppers Coal Co., for example, has a country-wide sales organization for the distribution of domestic sizes of coal from its various mining interests. These properties include Houston Collieries Co., Keystone Coal & Coke Co., Tidewater Coal & Coke Co., and Houston Coal & Coke Co., producers of Pocohontas coals. Other coal properties include Elkhorn Piney Coal Mining Co. and Melcroft Coal Co. The Koppers Co. (Pa.), assembles and builds by-product coke and gas ovens, benzol, toluol, napthalene, tar, gasoline and ammonia recovery plants. The Koppers Erecting Co. designs and builds by-product coke plants, transmission and pipe lines, conduits, subways, equipment, machinery, etc., for carbonization, distillation and gasification of coal and coal products. The Bartlett Hayward Co. builds gas holders.

Although figures are not available showing total assets of the various Koppers interests, the balance sheet of the Koppers Gas & Coke Co., which recently listed 200,000 shares of preferred stock on the Pittsburgh stock exchange, gives data for this subsidiary as of Sept. 30, 1928. Total assets after giving effect to the preferred stock financing, amounted to $101,830,349. Property account was $28,316,204. Current assets of $16,748,480 compared with current liabilities of $971,739.

In 1740, the most famous of all eastern Pennsylvania forges, known as Mt. Joy and later as Valley Forge, was started.

Metalworking Machinery Statistics for 1927

Sixty-two establishments in 1927 were making metalworking machinery other than machine tools, according to the census of manufactures of the department of commerce. The value of their product in 1927 was $31,748,667. Nine each of these establishments were in Connecticut and Ohio, eight each in Illinois and Pennsylvania, and five in New York. A detailed statement of the industry, excluding machine tools, follows:

Number of establishments	62
Wage earners (average for the year)[1]	6,125
Wages[2]	$9,957,960
Cost of materials, factory supplies, fuel, and purchased power, total[2]	$10,861,388
Materials and supplies	$10,189,337
Fuel and power	$672,051
Products, aggregate value[2]	$31,748,667
Metal-working machinery, including attachments and parts, total value	$30,044,774
Rod and wire working machinery	$679,588
Rolling-mill machinery	$7,774,325
Sheet-metal-working machinery	$15,673,062
Wire-drawing machinery	$488,431
Other metal-working machinery	$4,954,056
Attachments and parts	$475,312
Other products, value, and receipts for custom work and repairing	$1,703,893
Value added by manufacture[3]	$20,887,279
Horsepower	23,078

[1]Not including salaried employees.
[2]The amount of manufacturers' profits can not be calculated from the census figures, for the reason that no data are collected in regard to a number of items of expenses, such as interest on investment, rent, depreciation, taxes, insurance, and advertising.
[3]Value of products less cost of materials, factory supplies, fuel, and purchased power.

Get Alloy Steel Permit from German Interests

Pittsburgh, April 2.—The Firth-Sterling Steel Co. and Spang, Chalfant & Co. Inc. have made contracts with the Krupp interests of Germany for the manufacture of chrome nickel steel products. Permission has been granted to the Ludlum Steel Co., Firth-Sterling company and the Central Alloy Steel Corp. to manufacture chrome nickel into blooms, billets and other semifinished products. Several steel companies, including Spang-Chalfant, will purchase the semifinished material for conversion into finished products. This material is used to advantage in the form of tubes in the oil industry, particularly where it is required to endure stresses and corrosive action in the cracking process of petroleum.

American Rolling Mill Sales Expand

Net earnings of the American Rolling Mill Co., after all charges, amounted to $6,676,034 in 1928, compared with $3,748,564 in 1927. Net sales during 1928 totaled $61,867,914, compared with $39,087,518 in the preceding year. Of the total net sales in 1928, according to the annual pamphlet report, $54,813,903 represented sheets. Semifinished steel accounted for $3,885,284. The number of employes of the company at the close of 1928 was 11,151, compared with 8077 one year ago.

River Traffic Higher

Pittsburgh, April 2.—River traffic in iron and steel products in the Pittsburgh district increased during February over the January rate but in some instances declined below the level of the corresponding month of last year, according to figures just released by the United States engineer's office here. Adverse weather conditions in a measure restricted shipments on the Ohio river and the total was a decrease from February, 1928, although it shows a good gain over the January total. Traffic over the Monongahela river set a new high mark for February. For the second consecutive month no steel was moved over the Allegheny river.

Increased iron and steel traffic is looked for during ensuing months of the year particularly over the Ohio river to Cairo, Ill. The Jones & Laughlin Steel Corp. recently doubled its steel shipments to points on the Ohio and Mississippi rivers, and already this month it has sent two tows to southern points. Comparative monthly figures follow:

1929	Allegheny	Monongahela	Ohio
January	.....	80,402	48,471
February	.....	83,358	72,203
1928			
December	.....	79,595	78,213
November	800	143,238	137,019
October	1.130	131,281	130,808
September	200	136,227	125,062
August	50	109,738	124,066
July	.....	91,834	90,145
June	2,350	75,422	96,156
May	1,863	86,722	112,818
April	470	87,581	110,356
March	725	77,908	77,945
February	385	73,360	87,635
January	330	78,069	69,750
Total	8,303	1,160,975	1,239,973

To Move Ties by Barge

Birmingham, Ala., April 2.—The Atlantic Steel Co. plans to move 3000 tons of cotton ties from Birmingham to Mobile, Ala., and New Orleans via Warrior river barges of the Inland Waterways Corp.

The new $500,000 plant of the Lycoming Mfg. Co., Williamsport, Pa., subsidiary of the Auburn Automobile Co., will be ready for operation shortly after April 15 on the manufacture of aircraft engines.

Arkansas Scrap Rates To Be Revamped

Washington, April 2.—The present rate on scrap iron and steel, in carloads, applicable to interstate shipments between points in Arkansas, and from points in Arkansas to Memphis, Tenn., St. Louis, Chicago and Alton, Ill., and points taking the same rates or rates basing thereon, subject to a minimum carload weight of 50,000 pounds, have not been found unreasonable by the interstate commerce commission in a decision in the case of the Waste Material Dealers' association of Arkansas against the Chicago, Rock Island & Pacific railroad.

It was found, however, that reasonable alternative rates for the future are "rates which, subject to a 70,000 pound minimum, do not exceed 13.5 per cent of the corresponding first-class rates prescribed in 123, I. C. C., 203, for application from and to the same points" Reasonable alternative rates were prescribed and reparation was denied.

Freyn Engineers to Give Russia Help

Chicago, April 2.—A group of engineers and specialists will be sent to soviet Russia by the Freyn Engineering Co., Chicago, to help plan, design and build new iron and steel plants, according to an agreement signed by the Russian soviet government and the Freyn company. The American engineers also will assist in the reconstruction and modernization of existing metallurgical plants. The American engineers will co-operate with Gipromez, the State Institute for Projecting New Metal Works, at Leningrad, U. S. S. R.

The group of Freyn engineers will sail from New York about April 15, beginning work in Leningrad May 1. They will be under direction of L. E. L. Thomas, vice president of Freyn Engineering Co. The contemplated program for the soviet government in the next five years calls for the building of ten new iron and steel works, as well as extensive remodeling. Estimated value of investments to be made in the iron and steel industry alone exceeds $1,000,000,000, it is stated.

Approximately 5,000,000 pounds of copper is consumed annually in the manufacture of oil-burning installations for heating purposes and power production, according to a survey completed by the Copper & Brass Research association.

CONSTRUCTION and ENTERPRISE

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North Atlantic

NEW HAVEN, CONN.—Seamless Rubber Co., Hallock street, plans the construction of a power plant, 35 x 55 feet.

WASHINGTON—Potomac Electric Power Co., 231 Fourteenth street northwest, has awarded the contract for the construction of a substation to R. P. Whitty Co. Inc., 917 Denrike building.

OLD TOWN, ME.—Water district commission has awarded the contract for the construction of a pumping station and filtration plant to A. Bartington, 1 Washington street, Boston. (Noted March 7.)

CHATHAM, MASS.—Board of selectmen plans the construction of a water system and pumping station.

HOPKINTON, MASS.—Water department, J. F. Sullivan chairman, plans to extend and improve its waterworks, including the construction of pumping station, etc.

PROVINCETOWN, MASS. — Provincetown Light & Power Co., H. F. McDonald manager, plans the construction of a power plant on State road.

PATERSON, N. J.—Wright Aero Corp., Lewis street, Guy Vaughan president, has awarded the general contract for the construction of a 1-story plant addition to J. W. Ferguson, 152 Market street.

BUFFALO—Arrowhead Steel Products Co., 1101 Stinson boulevard, Minneapolis, W. E. Wilbert superintendent, plans the construction of a plant here.

BROOKLYN, N. Y.—Water Front Service Corp. has awarded the contract for the construction of four gantry cranes to American Crane Co., Friendship, N. Y.

FLUSHING, N. Y.—Flexible Cable Co., care of M. Klein, 65 Court street, Brooklyn, architect, plans the construction of a 1-story plant, 200 x 250 feet.

BRADFORD, PA.—Taylor Aircraft Co. has awarded the general contract for the construction of its new airplane manufacturing plant supplanting its work at Rochester, N. Y., to Simonsen & Lundgren, Bradford. (Noted March 28.)

COATESVILLE, PA.—International Combustion Engineering Corp., New York, has started work on a new plant here, to be a duplicate of the plant completed recently at New Brunswick, N. J.

EDDYSTONE, PA.—General Steel Castings Co., Eddystone, Pa., has started work on its main foundry building.

ERIE, PA.—Standard Stoker Co. plans alterations and the construction of a 1-story addition, 68 x 96 feet, 72 x 100 feet and 75 x 122 feet.

JOHNSONBURG, PA.—True-Tone Corp. has started construction of a new 3-story plant, 80 x 100 feet, for the manufacture of electrical apparatus.

PHILADELPHIA—Philadelphia Gas Works, 1400 Arch street, plans the construction of a power plant at Fifty-sixth and Lindberg streets.

WARREN, PA.—Thomas Flexible Coupling Co. has let the general contract for the construction of a new plant and office building to J. J. Guinnane, Jamestown, N. Y. A large amount of automatic machinery will be installed.

YORK, PA.—United States Chain & Forging Co. plans the construction of a plating department.

Southern States

HUNTSVILLE, ALA.—Rome Electric Range Co. is installing machinery and equipment in the plant it recently built here.

MONTGOMERY, ALA.—City of Montgomery has awarded the contract for the construction of a hangar and adjacent buildings, 150 x 150

Resale Equipment News

SURPLUS machinery and equipment and discontinued plants of the Yates-American Machine Co., Beloit, Wis., will be sold at public auction, April 9 and 10. The company has consolidated manufacturing operations in its three larger plants. The sale will be held first at its Williamsport, Pa., plant, and will be continued at the Montgomery, Pa., plant, both discontinued by the company. Included in machinery to be sold are planers, lathes, milling machines, shapers, gear cutters, grinders, drills and miscellaneous tools. Foundry equipment will be sold and finished parts and office fixtures will also be auctioned. The sale will be conducted by Michael Tauber & Co. and Samuel L. Winternitz & Co., both of Chicago.

* * *

Metals and equipment will be offered for sale at auction April 17 at the navy yard at Philadelphia. The sale will include about 2,000,000 pounds of ferrous metals, 77,000 feet of wire rope, 13,000 feet of antenna wire, 2376 twist drills, 444 machine bits, 44 Liberty engines, motors, motor generators and other material.

* * *

Assets and equipment of Wilson Bros. Mfg. Co., 218 May street, Chicago, were sold at auction March 27 by Samuel L. Winternitz & Co., auctioneers. The equipment included punches and dies, screw machines, lathes, lapping machines and other tools for production of band instruments.

Sales Calendar

April 9 and 10—Auction sale of discontinued plants and surplus equipment of Yates-American Machine Co., Beloit, Wis. Sale starts at Williamsport, Pa., plant and continues at Montgomery, Pa., plant.

April 17—Auction sale of surveyed material at Philadelphia navy yard.

feet, to Hodgson & Jones, North Perry street.

GURDON, ARK.—Phoenix Utility Co., Pine Bluff, has received the contract for power plant improvements for Arkansas Power & Light Co., Pine Bluff.

PINE BLUFF, ARK.—Finished Steel Products Co., incorporated recently, has awarded the contract for the construction of a plant to Pine Bluff Iron Works, 700 East Third street. (Noted March 28.)

PENSACOLA, FLA.—City of Pensacola plans the erection of an airplane hangar and other buildings at Corry field.

AURORA, KY.—Southern Industries & Utilities Inc. plans the construction of a large dam and hydroelectric power plant on the Tennessee river near here. The initial development will call for 240,000 horsepower, with the ultimate set at 528,000 horsepower.

NEW ORLEANS—Flintkote Co., R. W. B. Reade, works engineer, plans the construction of a boiler plant, to be equipped with two 460 horsepower boilers, etc. Contract for the construction has been awarded to Rust Engineering Co., 606 Grant street, Pittsburgh, for erecting 157-foot stack. Lionel Favret, Louisiana building, has general contract.

SHREVEPORT, LA.—Wings Inc., Commercial National bank building, Howard F. Noble, president, has awarded the contract for the construction of a hangar, 82 x 100 feet, to Orange Car & Steel Co., Orange, Tex.

CALIFORNIA, MO.—City of California plans to vote on $60,000 bonds for the construction of an electric light and power plant.

SALEM, MO.—City of Salem plans the construction of an electric light plant and distribution lines.

OMAHA, NEBR.—Kimball Bros. Elevator Co. plans improvements to its new foundry at 1020 South Ninth street.

OMAHA, NEBR.—Swift & Co., 1223 Leavenworth street, has awarded the contract for the construction of a 1-story boiler house, 65 x 100 feet, to E. E. Gilmore, Sunderland building. (Noted Feb. 28.)

SAND SPRINGS, OKLA.—Slater Bros. Turnbuckle Derrick Co. is issuing bonds to provide funds for expansion of its oil field derrick manufacturing operations.

SAND SPRINGS, OKLA.—Wackman Welded Ware Co., 2412 South Seventh street, St. Louis, Louis B. Wackman president, plans to establish a steel barrel manufacturing plant, 1-story, 50 x 200 feet, here. It is planned to be in operation by June 1.

CHATTANOOGA, TENN.—Mohawk Aircraft Corp., Minneapolis, Lytton Campbell manager, plans to establish an airplane branch plant here.

LAWRENCEBURG, TENN.—City of Lawrenceburg plans the installation of additional oil engines and generating units at its power plant in North Lawrenceburg.

BEAUMONT, TEX.—Kansas City Southern railroad, Kansas City, Mo., plans to start work shortly on yards, including the construction of machine shops, roundhouse, etc. (Noted Dec. 27.)

EL PASO, TEX.—Structural steel for a power house for the El Paso Electric Co. has been awarded to Virginia Bridge & Iron Co. (Noted March 14.)

FT. WORTH, TEX.—Missouri-Kansas-Texas railroad, St. Louis, has let the contract for improvements to yard facilities, machine shop, roundhouse, etc., to Bellows-Maclay Construction Co., Construction Industries building, Dallas, Tex.

VICTORIA, TEX.—Central Power & Light Co., 300 Jones avenue, San Antonio, Tex., plans the construction of a power plant and dam on Guadelupe river near here.

East Central

CHICAGO—Western Electric Co., 504 South Clinton street, has awarded the contract for structural steel for a cable plant to American Bridge Co.

CHICAGO—Lindberg Steel Treating Co., 221 Union Park court, A. N. Lindberg manager, plans the construction of a 1 and 2-story plant C. Frazier, 64 West Randolph street, is architect.

CHICAGO—Aladdin Industries Inc., 609 West Lake street, advises that it has awarded the contract for the construction of a machine shop to W. R. Dunkin & Son Co., Huntington, Ind.

KEWAUNEE, ILL.—Kewaunee Mfg. Co. advises that it plans the construction of a steel products plant and has engaged Frank D. Chase Inc., 720 North Michigan avenue, Chicago, as engineer.

PEORIA, ILL.—Caterpillar Tractor Co. has awarded the contract for structural steel for a building to Illinois Steel Bridge Co. (Noted Feb. 21.)

GARY, IND.—Pacific Electric Co., R. E. McClann, Hotel Gary, local manager, has awarded the general contract for the construction of a 1-story plant and office building addition to General Construction Co., 487 Broadway.

DETROIT—Detroit Lead Pipe Works, 600 West Larned street, has awarded the general contract for a warehouse to Austin Co. (Noted March 7.)

DETROIT—Federal Mogul Corp., 11031 Shoemaker avenue, has let the contract for the construction of a foundry building to Austin Co. (Noted March 14.)

DETROIT—National Stamping Co., 617 Glover street, has awarded the contract for the construction of a plant addition to W. J. C. Kaufmann.

DETROIT—City Council has canceled the contract with Louis Kamper, Detroit architect, for the plans for a municipal hangar, and John W. Reid, commissioner of public works, has been commissioned to proceed with the erection of the building.

DETROIT—McManus Steel & Iron Co., 3290 Wight avenue, W. T. McManus vice president, has awarded the general contract for plant alterations to E. F. Lang, 203 Hammond building, 31 West Fort street. (Noted Jan. 31.)

DETROIT—Cadillac Motor Car Co., 2860 Clark avenue, has awarded the general contract for the construction of a 1 and 4-story building to Martin-Krausman Co. The Cadillac company plans to spend $5,000,000 during the next two years on an extensive building and new equipment program. The program includes an automatic screw machine building, an engineering building, an addition to its present iron foundry, an addition to the chrome, copper and nickel-plating division, an addition to the LaSalle assembly plant, etc.

LANSING, MICH.—Lansing Motor & Pump Co. has increased its capitalization from $10,000 to $75,000 and has changed its name to the Ebel Hoist & Pump Co. The company plans to double its plant during the coming year.

MARYSVILLE, MICH.—Preas Metals of America plans the construction of a 2-story plant addition. George L. Harvey, Federal State Bank building, Port Huron, Mich., is architect.

MUSKEGON, MICH.—Maring Wire Co. plans the construction of a new plant at Western and Barclay avenue.

NILES, MICH.—City of Niles has purchased a 136-acre tract to be used for an airport. Modern airport equipment will be established at the field within the next four or five months.

PONTIAC, MICH.—Oakland Motor Car Co., division of General Motors Corp., Detroit, has let the contract for the construction of a 1-story plant addition to Austin Co., 16112 Euclid avenue, Cleveland. (Noted March 14.)

SELFRIDGE, FIELD, MICH.—Quartermaster department, Capt. R. S. Beard, construction quartermaster, Selfridge Field, contemplates the erection of a central heating plant.

CANTON, O.—Macomber Steel Co. has started work on an addition to its airplane hangar department which will double the capacity of that division. The addition is to be 76 x 188 feet.

CLEVELAND—National Bronze & Aluminum Foundry Co., East Eighty-eighth street and Laisy avenue southeast, is building an addition to increase its capacity 50 per cent.

Western States

EMERYVILLE, CALIF.—Structural steel for a plant for the Western Electric Co., 504 South Clinton street, Chicago, has been awarded to Judson-Pacific Co.

SPOKANE, WASH.—City council plans installing an automatic pumping station.

WALLA WALLA, WASH.—Pacific Power &

Light Co. plans the erection of an addition to its substation on land recently purchased. A new transformer with switching equipment has been authorized.

Canada

NEW GLASGOW, N. S.—J. W. Cumming Mfg. Co., manufacturer of mining cars, picks, etc., proposes to start work immediately on the erection of two new buildings in connection with its plant here.

BRANTFORD, ONT.—Brantford Roofing Co., Sydenham street, has awarded the contract to John M. Moore & Co., 489 Richmond street, London, Ont., for the erection of a plant here, 40 x 105 feet. (Noted March 21.)

DUNDAS, ONT.—Nu Flame Lamp Co. has awarded contract to F. G. Haskings & Co., 94 Sydenham street, for remodeling building here to be used for plant for manufacturing special lamps, etc.

FERGUS, ONT.—Beatty Bros. Ltd., washing machines, lawn mowers, etc., have awarded contract to C. Mattaini for the erection of an addition to their plant here. Three buildings will be erected, 96 x 336 feet, 72 x 96 feet, and 48 x 150 feet.

LONDON, ONT.—E. Leonard & Sons Ltd., York street, have awarded contract to Hyatt Bros., 288 Egerton street, for the erection of an addition to their boiler shops here to be 1-story, 55 x 100 feet. London Structural Steel Co. has the steel contract.

OSHAWA, ONT.—Farrwell Development Co. has acquired property on Albert street and Olive avenue where is proposes to establish a machine shop. When equipped the company will manufacture tools and dies and carry on general machine shop business. Officers of the company include F. R. Farrant, president; Edward Smith, vice president; J. MacKinnon, general manager, and O. S. Hobbs, secretary and treasurer.

SARNIA, ONT.—According to W. B. Boyd, president, Dominion Alloy Steel Corp., the company has extensive plant improvement program in prospect, whereby it proposes to install this year equipment for the processing of black sheets, with capacity of 15,000 tons per year.

STRAFFORD, ONT.—Refrigerating Equipment Ltd. incorporated recently with 100,000 shares of no par value stock, will establish a plant here for the manufacture of refrigerators and dairy equipment, etc.

TORONTO, ONT.—Canadian Ornamental Iron Co., 88 River street, has awarded contract to G. T. Lea, 16 Walker avenue, for the erection of a 1-story addition to its plant to be 60 x 132 feet, steel and brick construction. Dominion Bridge Co., Toronto, has steel contract.

TORONTO, ONT.—Auto Strop Safety Razor Co. Ltd., 83 Duke street, has awarded contract to Sullivan & Frid Ltd., 81 Victoria street, for the erection of a 3-story manufacturing plant, 55 x 90 feet, on Duke street.

TORONTO, ONT.—Details of an extensive program of hydroelectric power development in New Ontario were laid before the Ontario legislature in a plan whereby the Ontario hydroelectric commission eventually will develop nearly 600,000 horsepower on sites stretching from the Mississagi river, east of Sault Ste. Marie, across the province to the upper Ottawa river, a distance of about 275 miles.

WALKERVILLE, ONT.—Trussed Concrete Steel Co., Walker road, has awarded contract to S. E. Dinsmore & Co., Security building, Windsor, Ont., for the erection of an addition to plant here. It will be 1-story, 100 x 200 feet, concrete foundation, steel and brick construction.

WOODSTOCK, ONT.—Eureka Planer Co., Winnett street, has awarded contract to James Vance, Market square, for the erection of a 1-story addition to No. 3 foundry on Tecumseh street.

MONTREAL, QUE.—Montreal water board has awarded contract to the Canadian Westinghouse Co. Ltd., 1111 Beaver Hall Hill, for the supply and installation of switching equipment, transformers, generators, valves, etc., in the McTavish street pumping station and dam, on which construction work will be started this spring. Atlas Construction Co., 37 Belmont street, has the general contract for the projec.

ST. LAURENT, QUE.—T. Pringle & Sons Ltd., 410 St. Nicholas street, will prepare plans for the erection of a 1-story foundry, 200 x 600 feet, here for the Robert Mitchell Co. Ltd., 750 Blair street, Montreal, Que. Complete foundry equipment will be purchased. (Noted Jan. 24.)

Recent Incorporations

CHICAGO—Atlas Machine Co., 2714 Canal street, has been incorporated with $2000 capital to manufacture and deal in machines, metal specialties, etc., by A. G. Brile.

CHICAGO—Roller Guard Razor Corp., 5 South Wabash avenue, has been incorporated with $100,000 capital to manufacture and deal in mechanical and electrical devices by John Whitworth.

CICERO, ILL.—American Spiral Pipe Works, 4735 West Fourteenth street, has been incorporated with $1000 capital to manufacture and deal in pipe and fittings by J. H. Taylor.

BOSTON—Universal Appliance Co. has been incorporated with $15,000 capital to manufacture and deal in coal heating, gas heating and cooking appliances, by Percy F. Strout, 11 Wheelwright road, Medford, Mass.

BOSTON—James B. Replogle Laboratories Inc. has been incorporated with 5000 shares no par value stock to develop, manufacture and deal in mechanical devices, etc., by E. M. Bryant, 111 Summer street, Somerville, Mass.

BOSTON—American Electric Supply Co., 3704 Washington street, has been incorporated with 5000 shares no par value stock to manufacture and deal in electrical machinery and equipment, by D. A. Didofsky.

BOSTON—Key Electric Supply Co. has been incorporated with 1000 shares no par value stock to manufacture electrical machinery, equipment and supplies, by Harry P. Brenner, 457 Webster avenue, Chelsea, Mass.

FAIRHAVEN, MASS.—D. N. Kelley & Son Inc. have been incorporated with $100,000 capital to manufacture boats, aircraft, etc., by David N. Kelley, 103 Green street.

GREAT BARRINGTON, MASS.—Chamberlain Motor Co. Inc. has been incorporated with $25,000 capital to manufacture and deal in farm machinery, motor vehicles, etc., by Peter I. Adams Jr.

SPRINGFIELD, MASS.—Mason Engineering Corp. has been incorporated with 100 shares no par value stock to manufacture heating and refrigerating equipment, etc., by Trafton B. Mason, 380 Worthington street.

SPRINGFIELD, MASS.—National Industries Inc. has been incorporated with $100,000 in preferred shares and 2000 shares no par value stock to manufacture vibratory apparatus, etc., by Frederic R. Humpage, 145 State street.

DETROIT—Hercules Forging Co., 2962 Hart avenue, has been incorporated with $100,000 capital to manufacture, machine and deal in forgings and forging dies by W. J. Petty.

DETROIT—Globe Level Co., 2822 Woodward avenue, has been incorporated with $5000 capital to manufacture and deal in builders' and mechanics' tools by Raymond Mayes.

DETROIT—Michigan Election Supply Co., 1205 Dime Bank building, has been incorporated with $45,000 capital to manufacture and deal in mechanical voting machines by A. C. McDannel.

ST. LOUIS—Automatic Safety Appliance Corp. has been incorporated with $150,000 capital to manufacture door locking mechanism, etc., by Fenton G. Chapin, 1756 North Fortieth street.

ATLANTIC CITY, N. J.—Atlantic Iron & Metal Co. has been incorporated with $125,000 capital by Joseph B. Perskie, attorney.

JERSEY CITY, N. J.—Moreset Engineering & Machine Co. has been incorporated with $10,000 capital to manufacture pumps, valves, etc.

NEWARK, N. J.—Ideal Metal Products Co. has been incorporated with $25,000 capital by Morris Seifer, Newark, attorney.

NEWARK, N. J.—Engineering Advisory Corp. has been incorporated with 2000 shares no par value stock to manufacture tools, etc., by Meehan & Waltzinger, Newark, attorneys.

BROOKLYN, N. Y.—B. C. Lewis Mfg. Corp. has been incorporated with $10,000 capital to manufacture and deal in machinery, by H. S. Wolfman, 63 Park Row, New York, attorney.

FAR ROCKAWAY, N. Y.—Automotive Equipment Mfg. Corp. has been incorporated with $200,000 in preferred shares and 5000 shares no par value stock by C. Bunker, Far Rockaway, N. Y.

NEW YORK—Conveyor Mechanisms has been incorporated with $20,000 capital to operate machine shops, by D. Berkowitz, 130 West Forty-second street.

NEW YORK—S. & R. Wrought Iron Works has been incorporated with $10,000 capital by

M. Bloomgarden, 154 Nassau street, attorney.

NEW YORK—Ansonia Instrument & Machine Works has been incorporated with $25,000 capital by L. Rockin, 101 Essex street, attorney.

NEW YORK—Hudson Metal Spinning Co. has been incorporated with $5000 capital by A. Fuchs, 23 East Eighty-sixth street, attorney.

SYRACUSE, N. Y.—Crown Lock Nut Co. has been incorporated with $100,000 capital to manufacture automotive accessories by H. VanKirk, Greenwich, N. Y., attorney.

ABERDEEN, WASH.—Twin City Foundry Co. has been incorporated with $20,000 capital by Grays Harbor Welding & Boiler Shop, South F street.

BRECKENRIDGE, TEX.—Texas Boiler & Welding Co. has been incorporated with $15,000 capital by E. E. Day and V. P. Powell.

CALGARY, ALTA.—Bulldog Tractor Co. of Alberta Ltd. has been incorporated to manufacture and deal in tractors, automobiles, trucks and farm machinery, with $200,000 capital and 30,000 shares of no par value stock by Frederick W. Hope, Leigh B. Martin of Calgary, and Ernest W. O'Loughlin, of Edmonton.

BRANTFORD, ONT.—Leeming Richardson Ltd. has been incorporated to manufacture and deal in automobiles, motors, engines, etc., with $40,000 capital by Frederick C. Richardson, George Leeming, and Orma Leeming, all of Brantford.

HAILEYBURY, ONT.—Canadian Aerial Exploration Ltd. has been incorporated to manufacture and deal in airplanes, airships, flying machines, etc., with $200,000 capital, by Clarence F. Tuer, Cecil W. Tuer and Archibald G. Kirkpatrick, all of Haileybury.

KITCHENER, ONT.—Dominion Motor Sleigh Co. Ltd. has been incorporated, to manufacture and deal in motor sleighs and appliances with $50,000 capital by Harold W. Young, Frank J. Steffler, Alfred J. Arnold and others, all of Kitchener.

NORTH BAY, ONT.—French River Contracting Co. Ltd. has been incorporated to carry on the business as a contracting company with $100,000 capital by Edford McCleod of North Bay, Joseph Pilegg and Carmine Schiavone of Toronto.

OAKVILLE, ONT.—King Paving Co. Ltd. has been incorporated to carry on the business of engineer, builder and general contractor with $200,000 capital and 40,000 shares of no par value stock by Vernon W. Armstrong of Toronto.

OTTAWA, ONT.—Normand Builders Supplies Ltd. has been incorporated to manufacture and deal in builders' supplies with $50,000 capital and 50,000 shares no par value stock by Allan F. Moore, Herbert G. Heron, Herbert W. Pearson, and others, all of Ottawa.

TORONTO, ONT.—J. L. Wilson & Sons Ltd. have been incorporated to carry on the business of engineer and general contractor with $40,000 capital by George M. Willoughby, Harold L. Steele, William F. Woodliffe and others, all of Toronto.

TORONTO, ONT.—Super Health & Foundry Co. Ltd. has been incorporated to carry on a general foundry and pattern business with $40,000, capital by Chalmer H. Weir, Lorna M. Parker, and Daisy Morsman, all of Toronto.

TORONTO, ONT.—Pneumatic Oil Burners of Canada Ltd. has been incorporated to manufacture and deal in oil burners, and oil burning equipment with 5000 shares no par value stock by Sidney H. Robinson, Evan R. Peacock, Sadie M. Hutchinson and others, all of Toronto.

TORONTO, ONT.—North End Construction Co. Ltd. has been incorporated to carry on the business of contractor, and to manufacture and deal in builders' supplies with $40,000 capital by Chalmer H. Weir, Lorna M. Parker, Daisy Morsman and others, all of Toronto.

TORONTO, ONT.—Canadian Conduit Pipe Corp. Ltd. has been incorporated to manufacture and deal in conduit pipes, with 250,000 shares of no par value stock, by George H. Sedgewick, William D. Blair and Dorothy M. Jeffery, all of Toronto.

TORONTO, ONT.—J. D. Adams (Canada) Ltd. has been incorporated to manufacture and deal in machinery, tools and implements for roadmaking, with 200 shares of no par value, by Harold L. Wright, Jessie M. Perry, and Jessie M. Taylor, all of Toronto.

WINDSOR, ONT.—Giles Plumbing & Heating Supply Co. Ltd. has been incorporated to manufacture plumbing and sanitary fixtures, and heating appliances with $40,000 capital, by George B. Giles, Detroit; and Leigh H. Snider and William E. Kelly, of Windsor.

WINDSOR, ONT.—Trucks & Parts Ltd. has been incorporated to manufacture and deal in automobiles, trucks, motor cars, etc., with $100,000, by Charles P. McTague, Lorne R. McDonald and Violet Fitzsimmons, all of Windsor.

WINDSOR, ONT.—Ambassador Motors Ltd. has been incorporated to manufacture and deal in motors, parts and accessories with $40,000 capital by Charles C. Pilon, James C. Reid, Courtney B. Chick, and others, all of Windsor.

MONTREAL, QUE.—Electrical Trading Co. Ltd. has been incorporated to manufacture and install electrical machinery and devices with $50,000 capital by Adrian Knatchbull-Huggesson, William F. Macklaier and Maurice T. Lafleur, all of Montreal.

MONTREAL, QUE.—Sargent-Howard-Latourelle Ltd. has been incorporated to carry on the business as engineer and manufacturer of machinery, with $100,000 capital by Alexandre Chevalier, Oscar Robillard, and Frances McIntosh all of Montreal.

MONTREAL, QUE.—General X-Ray Co. of Quebec Ltd. has been incorporated to manufacture and deal in electro-medical, X-ray and scientific apparatus, with $10,000 capital and 750 shares of no par value stock by Claude S. Richardson, Francis G. Bush, Herbert W. Jackson all of Montreal.

MONTREAL, QUE.—Chimney Improver of Canada Ltd. has been incorporated to manufacture and deal in chimneys, furnaces, boiler, etc., with $100,000 capital and 20,000 shares of no par value stock by Ernest H. Cliff, Frank B. Chauvin, of Montreal, and Harold E. Walker of West Mount.

New Trade Publications

AIR FILTERS—Midwest Air Filters Inc., Bradford, Pa., in a current booklet, describes the development of its type of air filter, with data on its performance.

PIPE CLEANING TOOLS—Stow Mfg. Co., Binghamton, N. Y., has issued a circular illustrating its line of tools for clearing pipes by means of flexible shafting applications.

TRUCKS—A broadside by the Lewis-Shepard Co., Boston, illustrates the various types of its lift truck and accessories and their application to various industrial uses.

LUBRICATION—Alemite Mfg. Corp., Chicago, devotes the current number of its house organ to high pressure lubrication in power plants. Illustrations suggest economies in proper application of lubricants.

RHEOSTATS—Columbia Electric Mfg. Co., Cleveland, has issued a folder describing its cast grid rheostats. Grids and panels are illustrated and a table of capacities and other data is presented.

WELDING—Air Reduction Sales Co., New York, is circulating a reprint of a paper by J. L. Anderson on developments and progress of mechanical gas welding. Illustrations supplement the text.

CONTROLLER VALVES—Bristol Co., Waterbury, Conn., has prepared a new catalog of its automatic electric control valves, motor operated and magnet types, replacing a former bulletin. Illustrations and text cover the various types of valves in the company's line.

DIESEL ENGINES—Chicago Pneumatic Tool Co., New York, has issued a bulletin on its diesel engine. It covers the latest development by this company in diesel engines, stressing complete combustion and fuel economy. It is illustrated by halftones and diagrams.

ELECTRIC PROTECTION—Directions for grounding a galvanized roof against lightning form the subject of a bulletin by the National Association of Flat Rolled Steel Manufacturers. Its purpose is to give protection against harm from the elements.

TURRET LATHES—Jones & Lamson Machine Co., Springfield, Vt., has issued a folder giving closeup views of turret lathe settings for six consecutive operations in bar work. It illustrates economy of production by the use of proper tools.

ELECTRIC RECORDING—Esterline-Angus Co., Indianapolis, in a current bulletin, shows applications of electric recording instruments in office, mercantile and public buildings. They measure generated or purchased power, electric lighting, elevator operation or various other services.

POWER TRANSMISSION—W. A. Jones Foundry & Machine Co., Chicago, has issued a catalog of speed reducers, cut gears, pulleys and general power transmission on machinery. It contains complete listing of the company's products and practical working data of use to purchasing agent, engineer or production man.

STOKERS—Combustion Engineering Corp., New York, is circulating a new catalog describing its multiple retort underfeed stoker. The design of the stoker has been changed since the preceding catalog and the changes are shown in illustrations. It is designed for use in superstations.

UNIT HEATERS—L. J. Wing Mfg. Co., Newark, N. J., has prepared a catalog on its unit heaters, designed to present the subject on the basis of actual operating results, as well as on the scientific principles involved. The heaters are designed to give maximum distribution and uniform temperatures by recirculation of heated air.

Pipe and Tube Prices—Plate Extras

Steel Pipe

Pittsburgh and Lorain basing discounts, jobber's carloads.

Evanston, Ill., and Indiana Harbor, Ind., take differential 2 points less discount.

Chicago takes differential 2½ points less than Pittsburgh-Lorain basis.

Butt Weld

	Black	Galvanized
⅛-inch	45	19½
¼ and ⅜-inch	51	25½
½-inch	56	42½
¾-inch	60	48½
1 to 3-inch	62	50½

Lap Weld

2-inch	55	43½
2½ to 6-inch	59	47½
7 to 8-inch	56	43½
9 and 10-inch	54	41½
11 and 12-inch	53	40½

REAMED AND DRIFTED

Butt Weld

1 to 3-inch	60	48½

Lap Weld

2-inch	53	41½
2½ to 6-inch	57	45½

EXTRA STRONG—PLAIN ENDS

Butt Weld

⅛-inch	41	24½
¼ and ⅜-inch	47	30½
½-inch	53	42½
¾-inch	58	47½
1 to 1½-inch	60	49½
2 to 3-inch	61	50½

Lap Weld

2-inch	53	42½
2½ to 4-inch	57	46½
4½ to 6-inch	56	45½
7 to 8-inch	52	39½
9 and 10-inch	45	32½
11 and 12-inch	44	31½

DOUBLE EXTRA STRONG

Butt Weld

½-inch	42	32½
¾ to 1½-inch	45	35½
2 to 2½-inch	47	37½

Lap Weld

To large jobbers these discounts are increased on black by 1 point and a supplementary discount of 5 per cent; on galvanized by 1½ points with a supplementary 5 per cent. Extra 5 per cent granted in the 4th quarter 1927 and 1st quarter 1928 discontinued April 2, 1928.

Wrought Iron Pipe

Pittsburgh basing discounts, jobbers' carloads. Individual quotations made on delivered basis.

THREADS AND COUPLING

Butt Weld

	Black	Galv.
⅛ and ¼-inch	+11	+36
⅜-inch	23	5
½-inch	28	11
¾-inch	31	15
1 and 1¼-inch	35	18
1½ and 2-inch		

Lap Weld

1¼ and 1½-inch	Upon application	
2-inch	23	9
2½ to 3½-inch	28	12
4 to 6-inch	30	17
7 and 8-inch	29	16
9 to 12-inch	26	11

REAMED AND DRIFTED

2-inch to 6-inch—Two points less than above

EXTRA STRONG, PLAIN ENDS

⅛ and ¼-inch	+13	+48
⅜-inch	23	7
½-inch	28	12
¾-inch	34	18
1 to 2-inch		

Lap Weld

2-inch	29	13
2½ to 4-inch	34	20
4½ to 6-inch	33	19
7 and 8-inch	31	17
9 to 12-inch	21	8

DOUBLE EXTRA STRONG

Butt Weld

½-inch	+47½	+59½
¾-inch	+28	+40
1-inch	+34	+46
1¼-inch	+28	+40
1½-inch	+27	+39

Lap Weld

2 and 2½-inch	+13	+25
3 to 4-inch	+ 8	+17
4½ to 6-inch	+ 9	+18
8-inch	+12	

Large jobbers obtain additional discount of 1 point with supplementary discounts of 6 and 2½ per cent on black and galvanized.

On extra or double extra strong pipe fitted with threads and couplings basing discount lowered 5 points from plain end price. Fitted with threads only, basing discount lowered 3 points for random lengths.

Boiler Tubes

Pittsburgh carload discounts

STEEL (Lap Weld)

2 and 2¼-inch	40 off
2½ and 2¾-inch	48 off
3-inch	54 off
3¼ to 3¾-inch	56 off
4-inch	59 off
4½ to 6-inch	48 off

Subject to two 5 per cent discounts on full carload shipments. On less than 10,000 pounds, base discount reduced 6 points and one 5 per cent allowed. On 10,000 pounds to carload, base discount reduced 4 points and two 5 per cents allowed.

CHARCOAL IRON

1½-inch	1 off
1¾-inch	8 off
2 and 2¼-inch	13 off
2½ and 2¾-inch	16 off
3-inch	17 off
3¾ to 3½-inch	18 off
4-inch	20 off
4½-inch	21 off

Subject to 10 per cent discount on full carload lots. On less than 10,000 pounds, base discount reduced 2 points and no preferential allowed. On 10,000 pounds to carload, 5 per cent preferential allowed.

SEAMLESS COLD DRAWN

1-inch	63 off
1¼ and 1½-inch	55 off
1¾-inch	39 off
2 and 2¼-inch	34 off
2½ and 2¾-inch	42 off
3-inch	48 off
3¼ and 3½-inch	50 off
4-inch	53 off
4½, 5 and 6-inch	42 off

SEAMLESS HOT ROLLED

1¾-inch	39 off
2 and 2¼-inch	40 off
2½ and 2¾-inch	48 off
3-inch	54 off
3¼ and 3½-inch	56 off
4-inch	59 off
4½, 5 and 6-inch	48 off

Subject to 5 per cent supplementary discount for carload lots. On less than 10,000 pounds, base discount reduced 6 points. On 10,000 pounds to carload, base discount reduced 4 points and one 5 per cent allowed.

SEAMLESS STEEL MERCHANT BOILER TUBES

Extras:

Add 5 per cent for lengths over 24 feet and not over 26 feet.

Smaller tubes than 1-inch and lighter than standard gage to be sold at mechanical tubing list and discount.

Intermediate sizes and gages not listed above take price of next larger outside diameter and heavier gage.

SEAMLESS STEEL MECHANICAL TUBING

Base Discounts on New List July 1, 1925

Carbon 0.10 to 0.30 per cent.....50 to 55 off

Carbon 0.30 to 0.40 per cent.....45 to 50 off

Plus usual extras for forming and for long lengths over 18 feet and for commercially exact lengths.

SEAMLESS STEEL LOCOMOTIVE AND SUPERHEATER TUBES

Outside diameter	Gage	Net prices per foot f.o.b. Pittsburgh Price
2-inch	12-gage	14¼c
2-inch	11-gage	15c
2-inch	10-gage	16c
2¼-inch	**12-gage**	**16c**
2¼-inch	11-gage	17c
2¼-inch	10-gage	18c
3-inch	7-gage	33c
5⅝-inch	9-gage	50c
5½-inch	9-gage	52c

Plus usual extras for forming and for lengths over 24 feet.

Plate Extras

BASE

Rectangular plates, tank steel or conforming to manufacturers' Standard Specifications for structural steel, date Nov. 24, 1922, or equivalent, ¼-inch thick and over on thinnest edge (except for ¼-inch or 72 inches wide when ordered to weight in pounds per square foot—see width and gage extras), 100 inches wide and under, down to but not including 6 inches wide, 5 feet 0 inches long up to published limit in length but not over 80 feet 0 inch, are base. Extras per pound for width or diameter.

All Plates Rectangular or Otherwise

¼-inch thick and heavier, but not less than 11 pounds per square foot, if ordered to weight.

Over 100 to and including 110 inches	.05c
Over 110 to and including 115 inches	.10c
Over 115 to and including 120 inches	.15c
Over 120 to and including 125 inches	.25c
Over 125 to and including 128 inches	.50c

Plates less than ¼-inch or lighter than 11 pounds per square foot.

Over 72 to and including 84 inches	.10c
Over 84 to and including 96 inches	.20c
Over 96 to and including 100 inches	.30c

Over 100 inches add .35c to width extras for plates ¼-inch thick and heavier.

GAGE

Plates Not Exceeding 72 Inches Wide

Plates less than ¼-inch gage, to and including $\frac{3}{16}$-inch; or lighter than 10.2 pounds per square foot, to and including 7.65 pounds square foot..... .20c

Plates Over 72 Inches Wide

Plates less than ¼-inch gage, to and including $\frac{3}{16}$-inch; or lighter than 11 pounds per square foot, to but not including 7.65 pounds square foot.... .20c

Plates ordered 7.65 pounds square foot .30c

QUALITIES

Pressing steel	.10c
Flange steel (boiler grade)	.15c
Ordinary firebox steel	.20c
Stillbottom steel	.30c
Locomotive firebox steel	.50c
Marine steel	1.50c
Hull materials subject to U. S. Navy Dept. specifications for medium or soft steel	.10c
High tensile hull steel subject to U. S. navy department or equivalent specifications	1.00c
Boiler steel subject to U. S. navy department specifications, classes A-B	1.50c

Hull plates to hull specifications, required to stand cold flanging, take extra for flange steel.

Floor Plates

Checkered plates 1.75c

Checkered plates are not furnished to sketch and are rolled from "Stock Steel" only. No physical tests will be made on checkered plates.

INSPECTION

Mill inspection .....No extra

Charges for other inspection, such as Lloyd's or American bureau of shipping, will be made by inspection bureau direct to buyer.

CUTTING

LENGTH OR DIAMETER

All Plates, Rectangular or Otherwise

Five feet and over up to published limit of length, but not over 80 feet	No extra
Under 5 feet to 3 feet inclusive	.10c
Under 3 feet to 2 feet inclusive	.25c
Under 2 feet to 1 foot inclusive	.50c
Under 1 foot	1.55c
Over 80 feet to 100 feet inclusive	.10c

Over 100 feet add .25c plus .05c for every additional 2 feet or fraction thereof.

Regular Sketches

With not more than four straight cuts. (Including straight taper plates)

Additional extra ..... .10c

Irregular Sketches

With not more than four straight cuts. (Sketches cannot be sheared with re-entrant angles)

Additional extra ..... .20c

Model 24-P ejection type press, having box 100" long, 20" wide, 42" deep. Finished bales measure 20" x 14" x 14" minimum. Can be equipped with power operated loading hopper.

LOGEMANN SCRAP METAL PRESSES

Hydraulically compressed scrap commands at all times the *best price*, and can be conveniently stored and held for favorable markets; it is easily handled; it practically eliminates corrosion; it saves much time in remelting; cars can be easily loaded to capacity.

***LOGEMANN Presses* are built in several types and sizes to suit all requirements.**

You cannot go wrong on a LOGEMANN—it's a money maker from the day it is set in operation.

PIONEERS!

LOGEMANN Scrap Metal Presses, pioneers in this industry, enjoy an enviable reputation for long life and economical operation. They are in daily use in practically every large sheet mill, stamping plant, scrap yard, and in metal-working establishments of all kinds.

Our many years of accumulated experience, and services of our Engineering Department are at the disposal of all plants accumulating metal scrap of any kind.

LOGEMANN BROTHERS COMPANY, 3126 Burleigh St., MILWAUKEE, WIS.

"Where-To-Buy"

A classified by-products list of advertisers for the convenience of readers. If you don't find what you want, write us and we will tell you where to get it. ¶Index to advertisements will give you page number of any advertisers and by referring to advertisement you can get full particulars about products.

ABRASIVES (Polishing)
Carborundum Co., The, Niagara Falls, N. Y.
Norton Co., Worcester, Mass.

ACCUMULATORS
Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
United Engineering & Foundry Co., Farmers Bank Bldg., Pittsburgh, Pa.
Wood, R. D., & Co., 400 Chestnut St., Philadelphia, Pa.

ACETYLENE (Dissolved)
Air Reduction Sales Co., 342 Madison Ave., New York City.
International Oxygen Co., Newark, N. J.
Prest-O-Lite Co., The, 30 E. 42nd St., New York City.

ACETYLENE GENERATORS
Air Reduction Sales Co., 342 Madison Ave., New York City.
Oxweld Acetylene Co., 30 E. 42nd St., New York City.

ACETYLENE IN CYLINDERS
Air Reduction Sales Co., 342 Madison Ave., New York City.
International Oxygen Co., Newark, N. J.
Prest-O-Lite Co., The, 30 E. 42nd St., New York City.

ACIDS (Pickling)
American Chemical Paint Co., Ambler, Pa.

ADAMITE ROLLS
American Adamite Co., The, 410 Oliver Bldg., Pittsburgh, Pa.

AIR COMPRESSORS—See COMPRESSORS (Air)

ALLOYS
Driver-Harris Co., Harrison, N. J.
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.
Lavino, E. J., & Co., Bullitt Bldg., Philadelphia, Pa.
Metal & Thermit Corp., 120 Broadway, New York City.
Titanium Alloy Mfg. Co., Niagara Falls, N. Y.
Vanadium Corp. of America, 120 Broadway, New York City.

ALUMINUM
Summerill Tubing Co., Bridgeport, Pa.

ALUMINUM (Vanadium)
Vanadium Corp. of America, 120 Broadway, New York City.

ALUMINUM BRONZE (Acid Resisting)
Duriron Co., Inc., The, Dayton, Ohio.

ANGLES, TEES, CHANNELS—See STEEL (Structural)

ANNEALING BOXES
Farrell-Cheek Steel Foundry Co., Sandusky, O.
Petroleum Iron Works Co., The, Sharon, Pa.
Smith, George H., Steel Casting Co., Milwaukee, Wis.
Union Steel Casting Co., 62nd and Butler Sts., Pittsburgh, Pa.
United Engineering & Foundry Co., Farmers Bk. Bldg., Pittsburgh.

ANVILS (Cast Steel)
West Steel Casting Co., 805 E. 70th St., Cleveland, O.

APPRAISALS
McKee, Arthur G., & Co., 2422 Euclid Ave., Cleveland, O.

ARCHES (Suspended)
Detrick, M. H., Co., 140 S. Dearborn St., Chicago, Ill.

ARCHITECTS (Industrial)
Austin Co., The, 16112 Euclid Ave., Cleveland, O.

AXLES
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie Steel Co., 431 Carnegie Bldg., Pittsburgh, Pa.
Champion Machine & Forging Co., 3675 E. 78th St., Cleveland.
Illinois Steel Co., 208 So. LaSalle St., Chicago, Ill.

BABBITT METAL
Cadman, A. W., Mfg. Co., 2816 Smallman St., Pittsburgh, Pa.
Williams Alloy Products Co., The, Elyria, Ohio.

BALING PRESSES
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.

BANDS (Iron)
Bethlehem Steel Co., Bethlehem, Pa

BANDS AND HOOPS (Galvanized Strips)
Sharon Steel Hoop Co., Sharon, Pa.

BAR BENDERS
Kardong Bros., 346 Buchanan St., Minneapolis, Minn.

BARGES (Steel)
American Bridge Co., 71 Broadway, New York City.

BARRELS (Steel)
Cleveland Wire Spring Co., The, 1281 E. 38th St., Cleveland, O.

BARS (Alloy)
Central Alloy Steel Corp., Massillon, O.
Donner Steel Co., Inc., P. O. Box 1000, Buffalo, N. Y.

BARS (Concrete Reinforcing)
American Steel & Wire Co., 208 S. LaSalle St., Chicago, Ill.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie Steel Co., 431 Carnegie Bldg., Pittsburgh, Pa.
Donner Steel Co., Inc., P. O. Box 1000, Buffalo, N. Y.
Franklin Steel Works, Franklin, Pa.
Gulf States Steel Co., Brown-Marx Bldg., Birmingham, Ala.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Migret, Rene, 7 Boulevard DeFontaine, Charleroi, Belgium.
Nicetown Plate Washer Co., Inc., Juaniata & Clarissa Sts., Nicetown, Philadelphia, Pa.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago.

BARS (Iron)—See IRON (Bar)

BARS (Steel)
Bethlehem Steel Co., Bethlehem, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Carnegie Steel Co., 431 Carnegie Bldg., Pittsburgh, Pa.
Donner Steel Co., Inc., P. O. Box 1000, Buffalo, N. Y.
Franklin Steel Works, Franklin, Pa.
Illinois Steel Co., 208 S. LaSalle St., Chicago, Ill.
Illinois Steel Warehouse Co., 1319 Wabansia Ave., Chicago.
Inland Steel Co., First National Bank Bldg., Chicago, Ill.
Pacific Coast Steel Co., Hunter-Dulin Bldg., San Francisco, Calif.
Republic Iron & Steel Co., Youngstown, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago.
Tennessee Coal, Iron & Railroad Co., 1351 Brown-Marx Bldg., Birmingham, Ala.
Timken Roller Bearing Co., The, Canton, O.
Youngstown Sheet & Tube Co., Youngstown, O.

BEAMS, CHANNELS, ANGLES, ETC.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie Steel Co., 431 Carnegie Bldg., Pittsburgh, Pa.
Illinois Steel Co., 208 So. LaSalle St., Chicago, Ill.
Inland Steel Co., First National Bank Bldg., Chicago, Ill.
Migret, Rene, 7 Boulevard DeFontaine, Charleroi, Belgium.
Phoenix Iron Co., The, 20 So. 15th, Philadelphia, Pa.
Republic Iron & Steel Co., Youngstown, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago.

BEARING METAL
Williams Alloy Products Co., The, Elyria, Ohio.

BEARINGS (Ball)
New Departure Mfg. Co., The, Bristol, Conn.
Norma-Hoffmann Bearings Corp., Stamford, Conn.

BEARINGS (Journal)
Cadman, A. W., Mfg. Co., 2816 Smallman St., Pittsburgh, Pa.
Hyatt Roller Bearing Co., Newark, N. J.
Timken Roller Bearing Co., The, Canton, O.
Williams Alloy Products Co., The, Elyria, Ohio.

BEARINGS (Motor)
Hyatt Roller Bearing Co., Newark, N. J.
Norma-Hoffmann Bearings Corp., Stamford, Conn.

BEARINGS (Roller)
Hyatt Roller Bearing Co., Newark, N. J.
Norma-Hoffmann Bearings Corp., Stamford, Conn.

BEARINGS (Tapered Roller)
Timken Roller Bearing Co., The, Canton, O.

BEARINGS (Thrust)
Norma-Hoffmann Bearings Corp., Stamford, Conn.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS AND BUSHINGS (Brass and Bronze)
Erie Bronze Co., 402 W. 19th St., Erie, Pa.
Williams Alloy Products Co., The, Elyria, Ohio.

BENDING AND STRAIGHTENING MACHINES
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Hinman, D. A., & Co., Sandwich, Ill.
Kardong Bros., 346 Buchanan St., Minneapolis, Minn.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Long & Allstatter Co., Hamilton, O.
Sutton Engineering Co., Park Bldg., Pittsburgh, Pa.

BENZOL AND TOLUOL RECOVERY PLANTS
Koppers Construction Co., The, Union Trust Bldg., Pittsburgh, Pa.

BILLETS (Alloy and Carbon Steel)
Central Alloy Steel Corp., Massillon, O.
Hausman & Wimmer Co., The, Clark Bldg., Pittsburgh, Pa.
Washburn Wire Co., Phillipsdale, R. I.

BILLETS (Die Stock Steel)
Hausman & Wimmer Co., The, Clark Bldg., Pittsburgh, Pa.

BILLETS (Forging)
Bethlehem Steel Co., Bethlehem, Pa.
Central Alloy Steel Corp., Massillon, O.
Erie Forge Co., Erie, Pa.
Hausman & Wimmer Co., The, Clark Bldg., Pittsburgh, Pa.
Heppenstall Forge & Knife Co., 47th and Hatfield Sts., Pittsburgh, Pa.
Midvale Co., The, Nicetown, Philadelphia, Pa.
Wood, Alan, Steel Co., Conshohocken, Pa.

BILLETS (Forging, Alloy Steel)
Bethlehem Steel Co., Bethlehem, Pa.

See Index to Advertisements for Pages Containing Advertisements of Companies Listed Above